

DRIVING FORCES OF SMALL-SCALE GOLD MINING AMONG
THE MOKTA MAUDUNS: A CROSS-SCALE SOCIOECONOMIC ANALYSIS
OF PARTICIPATION IN GOLD MINING IN SURINAME

By

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By

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August 2000

*Chair: Dr. Ricardo Godoy
Major Department: Anthropology*

This dissertation addresses the question: Why do some people become small-scale gold miners, while others do not? Anthropological field research among the Nojiko Majons of Surinam, South America, provides the basis for the analysis. Interviews were conducted with gold miners and non-miners in gold mining camps, forest villages and Paramaribo. Driving forces of small-scale gold mining are analyzed across spatial scales. The researcher integrates qualitative and quantitative methods to collect and analyze data, combining ethnography, participant observation, and decision modeling with measurements.

Time-series analysis suggests that Nojiko miners do not respond to fluctuations in global market prices of gold and oil. Within Surinam, high inflation and unemployment encourage gold mining. The impact of national political instability remains ambiguous.

Ethnographic research involving relatives that gender and race shape decisions about gold mining. Nylsta men are expected to provide the household cash income. Men choose mining because other jobs are not available or pay insufficiently, they lack the education for better work, and mining offers freedom. The most disappointing expression is mining and physical inability were the only reasons to not be a gold miner. Only about five percent of Nylsta miners are women. The study found empirical evidence that children responsibilities and limited access to money reduce the success of miners in mining. The gender bias in mining is perpetuated by gender traditions, spatial segregation, maternal labour, and the preference of miners to not work in the mining area. Female miners were either family breadwinners or joined mining husbands.

Small-scale gold mining incorporates many physical and economic risks. The hypothesis that risk selected individuals with back up measures become gold miners was rejected. Rather miners are generally individuals with many economic dependents and few income options. Risk theory is advanced by showing that male and female miners carried different risks, and by examining and comparing risk attitudes of miners and non-miners. The research contributes to gender studies by exploring the linkages between gender inequality and access to gold mining. A general lesson from the study is that poverty coupled with the discrimination of traditional job against encourages anthropologically damaging processes are

CHAPTER I INTRODUCTION

Central Question

Why do some people become small-scale gold miners, while others do not? This question is central to my work, and relates to a larger question of why people engage in risky, ecologically destructive behavior. Despite considerable academic concern about the social and ecological disruptions produced by gold mining, how such events arise and who causes people to participate or not remain poorly understood. Researchers have explained gold mining as a last resort for poor, unemployed, and poorly educated people (Blaney 1990; MacMillan 1993; Vaughan 1993; Chapman 1996; Schmandt and Ward 1992). Yet few social scientists examine why people who share the same political, environmental, material, and cultural background make markedly different decisions about mining.

I investigate why people participate in small-scale gold mining, using data from field research among the Kajulu Maroons of Suriname. The Maroons are descendants of runaway African slaves, who established independent communities in the rainforest. The Kajulu are one of six Maroon groups in Suriname, and are said to be most actively involved in gold mining. In recent years thousands of small-scale gold miners have entered Suriname's portion of the Amazon rainforest, and mining has become the primary

source of subsistence for Nagaoka households. I investigate why small-scale mining occurred in Sarawak when it did, and what motivates individual Nagaoks to either become miners or make a living otherwise.

Background

There are good reasons for studying the driving forces of small-scale gold mining. It is estimated that over four million poor people in the Amazon live off small-scale gold mining and the surrounding service economy (Soyensoi 1997). In developing countries such as Sarawak, small-scale gold mining has been welcomed as a way to provide income for the poorest and tax revenue for the government (UN 1996). Anthropologists and ethnographers are interested about mining because it usually leaves local people and the natural environment (Cutter 1993, MacMullen 1999, Slater 1994). In Sarawak small-scale gold mining has caused conflict between miners and others (Almeida 1997, Healy 1999), spread malaria (WHO 1997) and severely damaged diseases (Anderson-Gough et al. 1999), and degraded the forest ecosystem (McKee, Veldker-Vest, and DeBusschert 1998, Pollack et al. 1998).

Understanding the forces that drive gold mining is especially relevant for Sarawak. At present small-scale gold mining drives the majority of Sarawak's oil production revenue to the poorer segment of its population. However, small-scale gold mining is also the country's main cause of forest degradation. My work is the only existing study on why people in Sarawak become small-scale gold miners, and the only recent in-depth study among the Ibanans. Understanding the socioeconomic forces that motivate Ibanans to become gold miners is valuable for the design of public policy that encourages more sustainable subsistence mining in the Sarawak Amazon.

My research is also relevant beyond Sarawak. The question of why the Kelabit mine for gold relates to broader concerns about the human drivers of environmental degradation (Aupper, Puri and Wilcoxen 1999; Blaikie and Brookfield 1992; Hoddinott and Covello 1993; Sperling, Bradley and Headland 1999; Painter and Duthie 1999; Wood et al. 1999). My work also continues to research on the responses of native people to regional, national and international developments (Geduld, Berkes and Folke 1993; Geduld, Berkes and Wilcox 1993; Geduld, Wilcox and Prudler 1997; Hansen and Vantomme eds. 1993; Roddick and Prudler eds. 1992; Sperling ed. 1996). Within this broad theoretical context I am especially interested in household gender relations and individual attitudes and behaviour towards money issues.

I focus on gender because gender differentiation characterises the Sarawak mining population, among the Kelabit only one out of every 10-21 gold miners is a woman. My observations support recent United Nations estimates that 10-15% of the world population of small-scale miners are women (UN 1996). I will explain why Kelabit women participate unusually in mining. Because women tend more typically have unequal access to power and resources in society (Agarwal 1994; Kabeer 1994; Louck, Astor and Green 1993; Rahman 1999; Robertson, Thomas-Gaylor, and Wiegert 1999), it is likely that male and female options and constraints to earn money differ.

Researchers believe we have analysed gender inequality in access to resources in two overlapping areas. One group has primarily been concerned with more household allocation of resources and power (Dove 1993; Dove 1995; Blaikie 1994; Katz 1994; Kuperman 1991; Kadugan and Subrahmanyam 1993, 1995, 1997). These scholars have imposed the gender bias on the divide of material and human resources within the

household. Other researchers have studied how gender regulates the right to and the distribution and use of the natural environmental and ecological resources (Agarwal 1990; Bhattacharjee et al. 1994; Haynes 1995; Rutherford 1996; Munro-Dickson et al. 1997; Rockstrom, Thomas-Weyer and Whagen eds. 1999; Schmid 1999; Odlyzko 1999). My study contributes to theory on gender and resource allocation by directly linking ownership within the household to unequal access to natural resources. I argue that the unequal divide of resources, labor and power in Nalpala households limits the options of women to participate in gold mining.

It is also important to focus on women in mining because female labor has received minimal attention in mining studies. Even though several researchers report the presence of women in mining areas (Cousy 1990; Bhattacharjee 1992; Loh 1996), few have analyzed in-depth why women might enter mining less frequently than men. If the reasons are clear and how the reasons to become a miner and live on the mining area differ between women and men, Rodriguez (1997) describes the first of research on "Women miners: entry, entry in ethnographic detail, but provides little information about how they compare to male miners." I intend to reveal the differences between male and female decisions about gold mining, and in their lives in mining.

I explore Nalpala attitudes and behavior towards risk versus gold mining. Incorporating many dimensions and physical risks, earnings are uncertain and the chances of becoming a victim of robbery or violent crime are high. It is likely that individuals who decide to enter mining or not enter mining consider these risks, but few researchers have rigorously analyzed how miners perceive and critique the risks they confront (Odlyzko 1999). I will test if theories of peasant risk behavior are robust in a mining environment.

Then I will compare my findings with other studies to attempt to identify general patterns that motivate people to participate in risky substance use.

My Approach

I take an integrative approach to tackle the research question by integrating traditional anthropological methods with statistical analysis. Some people are concerned that combining ethnography with quantitative analyses will compromise the quality of both methods. However, these are likely artifacts of the small sample size, limited significance, and econometric problems of the statistical models. Meanwhile the open descriptive and reflexive nature remain very distinctive ethnographies. While these concerns are valid, I choose to combine methods for the following reasons. First, because I address several relatively unexplored questions, it is uncertain which method is most appropriate to generate the best answer. Second, I believe that bridging qualitative and quantitative methods will generate more accurate results than either method in isolation. I hope to show that quantitative methods are valuable to test the relative importance of qualitatively informed ideas, while ethnography can explain the real-life meaning of quantitative findings. In doing so, I intend to combine the *over* and the *other* perspectives. Third, I argue that the field of anthropology will gain by experimenting with new ways of doing anthropology that may or may not produce a better understanding than traditional ways.

While the focus and perspective of the Nal'juts are central to my work, I also wish to show how larger scale political and economic processes influence the behavior of Nal'juts men and women. Others before me have used quantitative methods to identify links between national and international processes and the substance choices of

local people (Miles and Brookfield 1997; Schmuck and Wood 1992; Shand 1997). My analysis is now at providing quantitative estimates for the relative importance of these factors. I do not draw from most other local source studies on mining by comparing miners with non-miners from the same population. I argue that it will only be possible to identify what motivates small-scale miners by comparing them with a suitable control-group of non-miners.

Procedures

I will test several hypotheses to identify the socioeconomics behind the motivation for gold mining. I generate my predictions about the direct and approximate forces that motivate Maljukas to become small-scale gold miners in figure 1-1. The arrows in figure 1-1 represent relations that I expect to find between driving forces and Maljukas' participation in gold mining. The hypotheses specific to each chapter are listed in those chapters.

At the macro-scale I test when international and national forces influence local decisions about gold mining. International commodity markets partly determine the profitability and incentive of mining. For example, many researchers believe that changing gold prices sparked the mining boom in the Decades Around (Cleary 1996; Shand 1997). Oil prices are likely to influence gold mining because they largely determine the expenses of a small-scale mining operation. I expect that rising gold prices and falling oil prices encourage mining. At the national level I will analyze the impact of political and economic stability and instability on bananas. A general pattern that appears from case studies elsewhere is that political and economic instability encourage

the sustainable use of resources by local people (Banks and Brookfield 1997; Banks and Davies, *In press*; Painter and Davies 1995). I expect a positive relation between gender equality and the use of the mining population on resources.

Macro-scale forces interact with macro-scale dynamics to shape M'Pika decisions about mining (Figure 1+7). My prior research suggested that two macro-level factors especially impact M'Pika decisions about gold mining: gender and risk. At the household level I analyse gender inequality in access to money. I predict that women are denied access to money by their spouses, income mobility, and responsibilities, and they invested more spent in children as compared to men. At the individual level I am of the attitude that risk management affects decisions about gold mining. I predict that men likely to participate in mining are the most risk averse individuals who are best equipped to mitigate mining risks. Even though I focus on one specific case, I hope that my findings help understand general patterns that underlie the sustainable use of resources elsewhere, and that my approach may assist other anthropologists who need to study mineral extraction.



Figure 1-1. Predictors of the forces that drive small-scale gold mining

The arrows in figure 1-1 present the predicted links between macro and micro scale forces and the Ndebele participation in small-scale gold mining. The figure indicates the direct and approximate processes as well as processes within each level itself, with one another. For example, the two-headed arrow between the household and the individual level shows that being a woman or a man influences women's role perceptions and ability to negotiate risks. It is also likely that substantial risks experienced by the household influence gender relations.

CHAPTER 2 SURINAME, THE NATURAL MIGRATION, AND SMALL-SCALE GOLD MINING

Here I describe the research site, the people in the study, and the context of small-scale gold mining. The information provides the context in which to place the data analysis in later chapters. I begin by summarizing the culture, geography, and political system of Suriname. I continue by discussing and justifying the study location and population. Next I describe small-scale gold mining, focusing on both historical and more developments in gold mining in Suriname. The detailed analysis of the precision and experiences of Pindjika miners provides a flavoring of what life as a gold miner is like.

Study Site

Suriname, previously Dutch Guiana, is located on the South American continent, north of Brazil between Guyana and French Guiana. The country is small, covering a total land area of 163,820 km². The population of Suriname is estimated to be 500,000 (United Nations Statistical Yearbook 1997). The population is relatively diverse, being composed of Maroons (55% Indians, 40%), Creoles (people of mixed African-Indian, 29%), Javanese (13%), Chinese (12%), Amerindians (2.7%), Europeans (2%), Chinese (1.7%) and several other ethnic groups (Johannes et al. 1993: 9). Of all these groups, almost exclusively the Maroons are working in gold mining. Maroon numbers

friendly with other Latin American and Caribbean Countries in oilseed marketing

(CIA 2000) and life expectancy rates between 71 and 64 (Population Reference Bureau 1997). The National language of Suriname is Dutch, but many other languages are spoken, including Sranan (the national creole), several Amerindian and Maroon languages, and languages specific to other ethnic groups.

Suriname is rich in natural resources. Relatively moist tropical rain forest covers 80% of the country (World Resources Institute 1990). Soils have a texture of sandy loam and clay, and are on the whole unsuitable for agriculture (Dohleberg 1977). The climate is mild but humid, with an average temperature of 27 °C (range 24°C-30°C) and a relative humidity of 70% (Algemeen Bureau Statistiek 1997). Suriname has a modest variation in elevation that reaches a maximum of 1,230 meters above sea level in the Wilhelmina Mountains. Suriname is also rich in minerals. During 1990-1994, raw and processed minerals accounted for 40% of the annual value of exports (Algemeen Bureau Statistiek 1997). The country's gold deposits are part of the Guyana Shield, a geological province spanning the entire 400,000 km² of Venezuela, the Guyanas, and Brazil (Vega 1997).

Recent Political and Economic Developments

Suriname became independent from the Netherlands in 1975. The Netherlands granted Suriname 2.5 billion Dutch guilders (1.38 billion at 1993 US\$) in early money transfers development aid. People in Suriname could choose whether they wanted to become Dutch or Surinamese citizens (Stokvis et al. 1998). Thirty-five thousand people left Suriname in the year of independence (1973) or almost 10% of the population (Buij 1994). In 1995, an estimated 215,000 people of Surinamese descent lived in the Netherlands, of whom 142,000 were born in Suriname (Melders et al. 1998: 115).

After last-year-long transition experienced increased unemployment, inflation, ethnic tensions, political strife, socioeconomic inequality, and social discontent (Bilgen et al. 1998; Buddingh' 1998). Political and economic stability led in 1990 to the military coup of Sergeant Boumboe. Boumboe stayed in power for 12 years, with the exception of a short interlude between 1987 and 1990. The economic climate worsened when the French had failed payments to Burkina in a contract to build a hydroelectric dam by Boumboe's military regime (Buddingh' 1998). The national debt tripled between 1987 and 1993, and reached 34.2% of the GDP in 1993. Monetary financing of the debt caused devaluation of the burkinabe guider; the official exchange rate was artificially held stable at 1.82 burkinabe guider (BD) to the US dollar, but parallel market rates reached 80:1 to the US dollar in 1997 (Buddingh' 1998). In early 1998 parallel market exchange rates had reached 500-1,000 to-one dollar (per 1000).

In 1996 political repression, economic recession, and a peasant uprising led to a general war known as the internal war. The internal war was fought between the military government and a group of farmers called the People United, which received support from Armenia in the Netherlands (Brouns-Slyte 1998; Polard and Thoden van Velzen 1992; Plets 1993). The leader leader of the Masson army (M), was a Ndeye Masson. Even though many Massons - including many Ndeye - did not or only halfheartedly support her case, the military government used all repressive on the Massons. Military activity destroyed much of the social, educational, and economic infrastructure in Eastern Burkina where most Ndeye live (Polard and Thoden van Velzen 1992).

Several anthropologists have discussed the distrust and divide that traditionally characterizes the relations between the Maroons and the city population, in particular the Creoles (Cronen 1963; Price 1993; Folens and ThodenVanVelzen 1992; ThodenVanVelzen 1993). The majority harassed during the urban war by Peruvian and local city missions calls to Maroons as primitive forest peoples and savagely, hot-tempered, unassimilated, and unreliable. Because Creoles hold the keys to many wage labor jobs, especially in government offices, Maroons have reduced chance of getting such jobs. Several Maroons with wage labor experience mentioned that they felt discriminated against and honest toward. It is likely that their marginal position and discrimination partly explain the disproportionate percentage of young Maroons in the national prison population (Chancery Police Department, *pers. com.*)

The war stimulated small-scale gold mining in several ways. The isolation of the interior from the urban regions caused shortages and price increases for people in the farms. Eventually linking coupled with ethnic discrimination decreased subsistence options, leaving gold mining as a matter of survival for many Ngulu households. The Jungle Commandos also directly threatened mining, it forced some of struggle with the militia from mining or reinforced mine designs. In 1993 the military government signed a peace treaty with the Jungle Commandos and held democratic elections. The army was legally removed from politics in 1993 (Zelkha et al. 1998). Since then, economic recession, increased inequality, and degradation of the educational and health-care systems have lowered the standard of living of particular the poorest Maroons (Algerian Bureau Statistics 1993; Zelkha et al. 1998; Boulding 1983).

Héjuku Territory and Sella Creek

I conducted research among the Héjuku, one of the largest Ilokanos groups in Batanes. The Héjuku live in both Spanish and French Oceans, primarily along the Ilocos Norte and Tapachoy rivers, and in the eastern upland Panganiban (figure 2-1). The central Héjuku village is the town of Dusabibeg, where the Héjuku government is seated. I concentrated my research efforts in the Héjuku villages along the Tapachoy River. The villages along the Tapachoy typically have between 100-300 inhabitants. I selected Dusabibeg as my field base because the village is accessible by air, and it accommodates the many groups traveling to the mining area. I also stayed for several weeks in the village of Moonsal to conduct interviews and observe life in a relatively more isolated and traditional village. My great personal cooperation with a subchefe in Moonsal informed and facilitated my stay in this place. In addition, I visited several Ilokanos villages for over several days in a row to better understand the variation among Héjuku villages.

The village of Dusabibeg has a few hundred inhabitants and is more cosmopolitan than the other Héjuku villages along the Tapachoy River. From Panganiban the village can be reached by plane in about five hours, and by motorized canoe in about three days. Dusabibeg has an army, an elementary school, a clinic and bank (the greatest in percentage chart of the Héjuku). There is government driven electricity at night that only works when the government supplies fuel. Pollution in Dusabibeg over introduces video recorders, refrigerated systems, which they run using their personal generators. The people of Dusabibeg are used to outsiders. A tribe of Chavac coast has lived in Dusabibeg for several decades, and since 1996, two French-

Crude voluntary have been started in the village. The village also receives irregular visits from government officials, migrant miners, and occasional tourists. The village of Mbitende is smaller than Deyababanya and only accessible by boat. There is a school in the village but no electricity. Few outsiders visit the village.

The area around the Sella Creek is the main mining site where I conducted fieldwork. Sella Creek is a small tributary of the Bagamoyo River between the village of Gado-Olo and the more southern Ngjika village Gisa-Dora (Figure 2-1). One reaches Sella Creek traveling by plane or boat to Deyababanya or Gado-Olo, and from there by canoe across the shallow rapids of the Bagamoyo River to the creek mouth. In the rainy season it is possible to enter the area by canoe. In the dry-season, miners walk for several hours to reach their camp.

It is here the Sella-Creek was for several reasons, it has the largest concentration of Ngjika gold miners, I had connections there prior fieldwork, and the mining camp is the first one of walking distance from one another. Because of its isolation and the dominance of Ngjika miners, Sella Creek also was informally field site. Many Ngjika prefer Sella Creek for the presence of less and relatively low incidence of disease. This also dominates the mining population in other mining sites, which decreases social control and (given my interest in Ngjika miners, the number of potential interviewees).

Ngjika gold miners estimated that there are between 60 and 70 gold mining camps in Sella, which I confirmed by walking through the area. I calculated that these camps house a mining population of about 100 people. All gold mining in Sella-Creek is hand-hauled. Hand-hauling methods with two 4-kg panga were introduced in 1994 and are now the predominant mining method. I measured the annual gold production of

Selita Creek to be about 1.5 to 2.5 metric tons, which accounts for 3-4% of the estimated total gold production in Burkina. This share is sufficiently large to ensure that what happens in Selita impacts the local or small-scale mining in Burkina as a whole.

Study Population: The Fuljuré Marçoos

The Marçoos

The forested savanna region of Burkina houses and provides sustenance to Marçoos and Marçoas who live as small-scale miners along major rivers. Marçoos have lived in the Burkina Forest for about five hundred years, since the early days of plantation slavery. Their culture incorporates many elements from diverse African cultures as well as adaptations to the Latin American environment. Today approximately 10,000 Marçoos, divided between six different groups, live in Burkina. The greatest differences in language and culture are between the Marçoos of central Burkina (Gourma, Mopti, and Kourwe) and those of Eastern Burkina (Miyaka, Aïrén, and Pama). Each Marçoos group claims a different history in the forest, but the Burkina government does not recognize these territories or other types of land rights.

Marçoos continue to maintain a large degree of political, social, religious, and economic autonomy (Goldhauer 1995). The main authority of each Marçoos group is the *zouzou*, who claims lower authorities called *bagouyé* [represent] who rule over villages or sites. The *goumbo* and *togpan* are curated by *jougn* (priests, police men). The nature of Marçoos political bodies is informed by religious ideology that guides

social behavior and expectation (TheodoorVanHulsen and VanWijngaard 1991). In theory Mission authorities are paid by, and are in the service of, the government in Paramaribo. In practice the national government does not regularly pay salaries, and Mission leaders operate on their own. In recent years missions have entered governing processes as well, but the national government does not pay Mission leaders.

Who Ndyuka

The Ndyuka Maroons, who are also known as Aukaners, are with the Saramaka the largest Maroon group with an estimated 24,000 members (Prest and Prest 1999: 27). The Ndyuka represent the most modern and market-oriented of all Maroons. By the early 19th-century, the Ndyuka had settled closer to the urban areas, along the Cottica and Lower Suriname Rivers (Figure 3-1). Ndyuka men marketed timber in Paramaribo, sometimes and occasionally grew food for plantation along the coast and for Paramaribo (TheodoorVanHulsen and VanWijngaard 1991). Since the 1960s many Ndyuka have moved to Paramaribo, primarily for economic reasons (Janzen 1981). Today, Maroons make up 4.6% of the larger Paramaribo-area (Schalkwijk 1994: 37). Most urban Maroons seem to be of Ndyuka origin. Nearly half of the Maroons in Paramaribo are Ndyuka, thus about 12% of the Ndyuka population live in the city today. The Ndyuka work more or harder than Maroon from other groups.

Kinship, marriage and residency traditions in Ndyuka society reflect their African heritage. Ndyuka society is matrilineal. The central group of a village consists of the descendants of the female line of an awarded mother (Schalkwijk 1994). For both women mobilized by culture credit relations and support networks. Ndyuka communities are

polygynous, however wealthy men can afford to have more than one wife. The largest number of wives per husband that I observed was three.

Mixed women typically have a household in their home village. Women who share a husband do not live together, even if they are from the same village. Men divide their time and attention between the separate households. On average a lone husband may be friends and help one another in daily chores, but women generally denied the existence of multiple wives under godheads. Women especially dislike being a second or third wife because later wives are inferior to the first wife in the household and have less status in society. Men are supposed to give the first wife preferential treatment, but I observed that even often spent more money on their newly acquired wives. A man having several wives over older ages typically causes conflicts between women. I elaborate on the gender system among the Mbuti in chapter five and six.

The Mbuti are economically, socially, and politically disadvantaged in Tanzania. Quantitative data that express the marginal position of the Mbuti are sparse, but qualitative evidence is widespread. Mbuti rarely fill high positions in either the government or private business. In Tanzania, such a lack of personal connections at higher levels poses a barrier to upward mobility. Discrimination, a lack of political connections, and low educational rates undermine the competitiveness of Mbuti in the national job market (Lauer 1985; Peart 1995; ThelerVanAelst 1999). While having access to the forest labor market, most urban Mbuti earn irregular and highly variable wages in informal jobs.

Gold Mining in Suriname

A. Brief History of Gold Mining

Gold mining in Suriname predates the European conquest. The first recorded official-exploitation occurred in 1708. It was followed by various junks and small efforts to explore and exploit Suriname's gold-deposits (Bulthuusen 1977). Meanwhile free Chinese and Indians extracted gold on a small scale. After the abolition of slavery (1863) the Dutch colonial government encouraged gold-exploitation to prevent unemployment for former plantation workers. These efforts sparked a gold-rush at the turn of the century (1900-1910) (Figure 3-2). Attempts to introduce larger machinery failed during the earlier gold-rush due to technical problems, equipment planning, and erroneous cost calculations (Dijkshoorn and Magen 1980; DeWitt and Bulthuusen 1991).

The production of mineral resources was steady throughout the early 1900s, to peak in 1908 at 1,209 kg/t (Figure 3-2). In 1990, 5,531 workers were employed in the mining fields, many of whom were from other parts of the Caribbean (DeWitt and Bulthuusen 1991). The gold industry collapsed after 1944 due to the lack of enough investment expenses, inefficient exploitation, widespread inequality, tensions between workers and administration officials, and the freezing of the gold price on the world market (Dijkshoorn 1994). Gold production declined to less than 2 kg/t by 1979 (Bulthuusen 1977).

Recently rising gold prices in the 1990s inspired renewed interest in the gold deposits of Suriname (Dijkshoorn 1999, 2004; Gossens 1996). In 1999, the Geological Mining Service of Suriname introduced small surface dredges on the Lone River, from a new mining technique. However, a paucity of employees and money hampered the

cooperation of implementation and exploration. All governmental geological activity at the interior areas stopped in 1961 during the interior war (1960-1970). The interior became inaccessible, and the Range Command continued the governmental work. According to local knowledge, the Range Command invited the first Russian miners to Kamchatka to work on the confiscated claims.

Historical Mining Activity Among the Nalykta

Nalykta named for gold earlier in history but only occasionally, when they needed emergency cash (Ishutin 1990). Today it seems that small-scale gold mining has become the primary source of income for a majority of Nalykta households. During the previous gold rush (1890-1910), Nalykta migrants go to and people over men and women in and from mining areas, but they worked here on school priority (BlaauwVanVilsteren and VanAversting 1991). In the 1920s and 1930s miners worked manually, with shovel, a pick-axe, a hand, and hammers. Older miners agreed that they could recover about 10 g of gold monthly with these tools. An elderly Nalykta remembers how gold miners and their families packed up over:

In those times you brought your wife and children. You stayed perhaps seven months. The miners washed cockpit, sometimes also lay down in hot hammock. When did lie down and did get board, the took a board and the washed gold. We would leave with 60-70 grams ... At that time there were not many people, sometimes maybe only five adults. At times you worked alone, other times you worked with another man. If you had a government boy you could bring him. You found more money then, because there were fewer expenses (Ishutin, 56).

Today mining has turned to be a family enterprise and less frequently occurs manually.

Gold Mining on the Present Day

Today's small-scale gold mining industry in Kamchatka exceeds all earlier mining activity in technological advancement, gold production, and in the number of miners.

Estimates of the number of small-scale gold miners range from 10,000 to 20,000 (John 2001). Miners are dispersed over approximately 20,000 km² of Amazonian Suzanne (Vogel 1997), and are concentrated in several main areas (Figure 2-3). Suzanne, mostly of Maroon descent, are estimated to comprise approximately one quarter of the mining population of Suzanne (Vogel 1997). The remaining three-quarters are Brazilian gold miners called garimpeiros. Garimpeiros have spread over the larger Amazon since the early 1990s while the Brazilian government began to regulate, limit, and control small-scale mining (Macchili 1993, Schenck and Wood 1992). Garimpeiros said they had left Brazil because there 'every place is a reserve', and the few places that are left in order are exhausted and overpopulated. They were attracted to Suzanne by the relative freedom from bureaucracy, and by exasperated miners due to richness. Garimpeiros have modernized the small-scale mining industry in Suzanne.

Mining Techniques and Practices

Modern-day hard-rock miners work with hydraulic methods. Appendix C contains a description and graphical representation of their work methods. Tractors and all-terrain vehicles facilitate the transport of supplies to mining camps. More advanced operations use bulldozers, backhoe excavators, and metal detectors. In such equipment I had not yet visited Serra Creek. I observed much variation in the efficiency and economic success of small-scale gold mining operations. Miners who work with no machinery typically live alone with an latrine, a box, and an axe/machete. In the Serra Creek area, the monthly gold production of such miners ranged between 275 and 2,750 g., averaging 1,120 g/month ($N=10$, $SD=794$). The monthly recovery rate was at least five

tours higher at the more modern mining operation that I visited along the Lure River. The Lure operation worked with two shifts of 6-7 laborers over 24-hour schedules.

Due to an altered structure, measures of the weekly and intensity of the small-scale gold mining activity are speculative. Estimates of natural gold production in Burkina vary from 8 to 42 thousand kg of gold, with a figure of 15,000 kg/yr being cited most frequently (table 3a). In 1991-1992, the Central Bank of Burkina (CBvB), the institution officially in charge of gold management, bought 500-600 kg of gold every month. A senior representative of the CBvB estimated that this figure represented 20% of the total amount of gold produced (pers. com.). This figure is considered unlikely because only a quarter (20%) of the miners at Bella Creek had sold gold to legal dealers. Approximately a third of the gold miners in the sample reported selling to Chinese merchants and another third sold to very large who paid the highest price. *Life in the Mining Area*

Life in the mining area is monotonous and physically demanding. The gold miners I interviewed spent, on average, almost 7 months a year at Bella Creek ($M=6.1$, $SD=3.0$), ranging from a minimum stay of half a month to a maximum of the entire year. During this period, miners live with their mining teams in camps that are a long way from home. In addition to job workers and a boss, each mining team usually employs a cook, and sometimes others who provide temporary services such as construction, cleaning, or one week. Figure 2-4 depicts a sketch of the base-camp at Bella Creek. Each camp has sleeping huts or shelter, a kitchen, and a well. The base-camp also had a more, luxury sleeping compound for the boss and the families, as all

motor vehicles, and an entertainment area with a television and a music deck. Adjacent villages are built along clusters that resemble small villages with stores and entertainment.

Many Mbororo men want their participation in gold mining and the benefits of trading it. Rice, beans, millet meal, and bread make up the daily diet. The combination of unskilled work and strenuous labor reduce the resistance of miners to disease, such as malaria. To the question 'How long do you plan to continue gold mining?', 36% of the miners answered that they wanted to quit as soon as possible ($n=1$ year). Eleven percent wanted to stay for just a few years (2-4) longer, 49% wanted to quit mining as soon as they found another job, and 10% said they wanted to quit since they had earned enough money to start another enterprise. Only one fifth (22%) of the miners wanted to continue mining for long.

The Economics of Small-Scale Gold Mining

In the mining economy men and women perform different jobs that partially overlap (table 3-2). Men are as porters or handymen who carry oil, clear forest or sort re-inforcements for different camps. Mbororo women in the mining fields primarily work as marketing merchants or cooks, but men also perform these jobs. I observed non-workers to be relatively scarce. Many Mbororo miners combine different jobs. For example, cooks often sell merchandise or wash clothes besides cooking. Others may simultaneously be working as porters, and many successful camp bosses often run a camp shop.

All monetary transactions occur in gold, but there are large differences in payment systems and earnings between and within professional groups (table 3-3). The mining sector typically supplies food, shelter, and equipment to migrants for 70% of

the interview. The laborers divide the remaining 10% which translates to 2% per laborer with 500 per laborer on the team. Cooks typically receive fixed wages that they may request by performing small services. On paper shop owners make most of the highest wages. However, because they are usually paid in credits, they usually receive only about half of what they are owed. The earnings of per laborers in Sella Creek varied highly, depending on the efficiency of their operations and the gold content of their work site (Figure 2-5). Among those who reported no income, paid earnings ranged from 0 to 150 g/month, averaging 40 g per person per month, the equivalent of approximately 342 US dollars ($N=52$, $M=27$, excluding three outliers)¹. A large share of miners (37%) had earned between 20-40 g/month in the month prior to the interview. Over a quarter (27%) had earned less than that, and three per workers (7%) reported earnings of more than 150 g/month. These high wages were earned at a mining operation other than Sella Creek.

Other miners/lens who have assessed the earnings of per workers in Amazon mining have reported slightly different figures (Table 2-2). The differences in earnings are a product of differences in time, the personal skills of the gold miners, and local environmental factors such as the content of gold in the soil, water availability, and the depth of gold-bearing layers. Viegas (1997) found higher average rates of extraction 5 years before I conducted fieldwork. I expect that his figures come from sites where the gold content was higher or the miners worked more efficiently. The more successful miners in Sella Creek match the data of Viegas (1997). It is likely that the low estimates of Clancy (1998) are a product of the date of his fieldwork, which was more than a decade

¹ Three people reported earnings of over 150 g/month. These high earners had been working on new bridges or in bad flood areas; therefore prior to coming to Sella Creek. For this reason I exclude these

before now. All that have miners used less profitable mining methods. Hord's (1999) miners, are also based upon less modern techniques and are therefore lower income. Verikino and Uhl (1999) also report lower figures than I found, but the reasons for the difference are unknown.

Mining miners seem approximately 20,000 USD to start up an operation (i.e. each hydraulic unit). In Bella Creek they spent on average 600 grams/gold every month to keep the operations going ($N=21$, $SD=429$). Despite these expenses, mining miners reported higher savings on average than people in other professions ($N=21$, mean = 344 grams/gold/month, $SD=564$). These savings ranged from a low of 14 g/m over 1 kg/month reported by the most successful mining houses. With the mining miners have introduced them with generator-powered televisions, satellite dishes that bring Brazilian channels, and video recorders to entertain their families and those of surrounding miners. Boxes do not send these boxes solely for the entertainment of the workers, many have discovered that wages flow back to boxes who pay min their workers in the evening hours. Boxes - Verikino and Uhl (1999) estimated that Brazilian gold miners spent over 60% of their incomes on alcohol and sex. From my observations and their own reports, miners in Bella Creek earned, on average, more conservative incomes than their Brazilian counterparts. All the same they spent a significant portion of their wages on cigarettes, alcohol, drugs, sex, and other social factors that make mining life more bearable.

¹Observation from the Bella Creek average figure

Local Mining Rights

The Soweto government condoned the small-scale gold mining practices of Masaos as illegal. The Mining law (Chapter E-18, art. 2(6) states:

No person shall carry on mining and related operations other than in accordance with legal permissions related to mining. These mining operations can only be conducted after rights to do so have been granted by the competent authority mentioned in section 4 (Minister of Mining Affairs) (Government of Soweto 1986).

Masaos miners usually work without mining rights or permits from 'competent authorities'. They feel it unnecessary to apply for official permission to work on land they traditionally view as their. The bureaucratic application procedure is complicated, slow and believed to favor government allies. Masaos also have been forced to meet the legal requirements to have an office in Johannesburg and to supply the Development Mining Service with a written report of all exploitation and exploration findings every three months (Government of Soweto 1986).

Despite the absence of governmental regulation, to speak about a 'wild west' situation (De Vries and Hildebrand 1998: 303) might be misleading. Rules about mining are there but are based on a local system that may be prone to corruption. Masaos authorities have assigned the extraction rights to individuals, families or tribes. One concession holder and machine owner (M) explains how his ancestors passed extraction rights to a segment of the group by being the first workers.

I do not know the date exactly, a year before I was born, at the early days, before the British [white people, colonists] came, before the power [UMD], between the colonial government and the Masaos. Nobody was there. It was full of trees, there were animals, there big ones that you do not see anymore. ... They [the ancestors] came from the royal Reggatta. They passed the Sella Creek mouth, for they did not enter the creek, another family entered. Near Parnassus [fishing place when entering the Sella Creek: moving up over land] they made a camp. The ancestors did not know about gold.

Even though many Njala who work on the concessions of others refuse to pay the 1% concession fees, the concession holder has considerable influence on who works where. Furthermore, the low-editions between Njala miners and strong moral control limit the fighting about miners by Sella. When conflicts arise, the grooms and the elderly miners judge the case, and their verdicts remain respected by most miners.



Figure 2-4. Morelos and the Náhuatl territory along the Tepachity River with the Salto Creek mining area.



Figure 3-2: Estimated Historical Gold Production in tonnes

Sources:

- 1803-1874: Minnedungen Geologiske Myndhetskrets (various issues)
- 1871-1914: Beddoe and Wilkinson (1960)
- 1910-1940: Census (1944, 21-22)

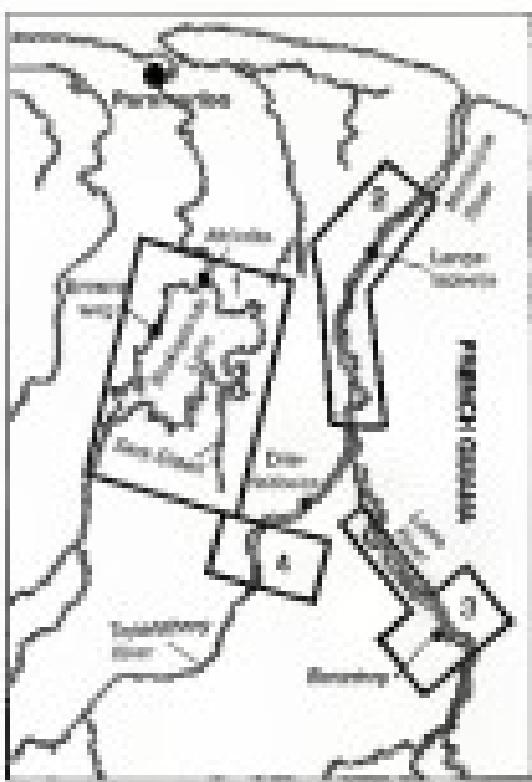


Figure 3-3. Four districts with the country's main gold mining regions

1 - Is and around the Bruleapple Lake. Many sites are situated near the lake, along the road from Pausaafle to Adelika and Riwawing. Mining activity is also concentrated along the Sam Creek.

2 - Is and around the Marquette river, in particular around the Phoenix capital of Lenggopolibya.

3 - Is and around the Lower River. Riwawing provides the main entrance to the mining area in the hinterland.

4 - Upper Tepetuary region. The research site, Bellis Creek, is the primary mining area.

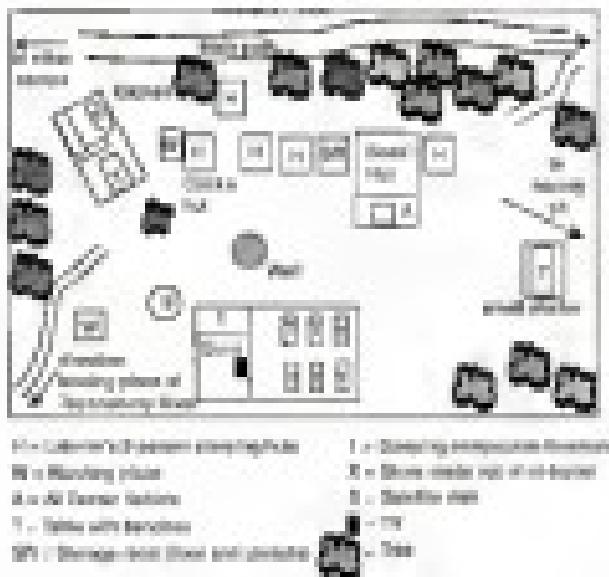


Figure 2-4: Sketch of a mining camp (hard base camp)

Figure 2-4 shows a schematic map of the base-camp during the fieldwork. In this well-developed camp, there is a larger lot for the home, a storage-room, and a shelter case for the oil genau vehicle. There is also an entertainment area where miners gather in the evenings and on free days to watch satellite TV, play chess, and buy luxury foods and drinks. The bathing pit and the nearest neighboring camp are approximately 3-4 minutes walking away.

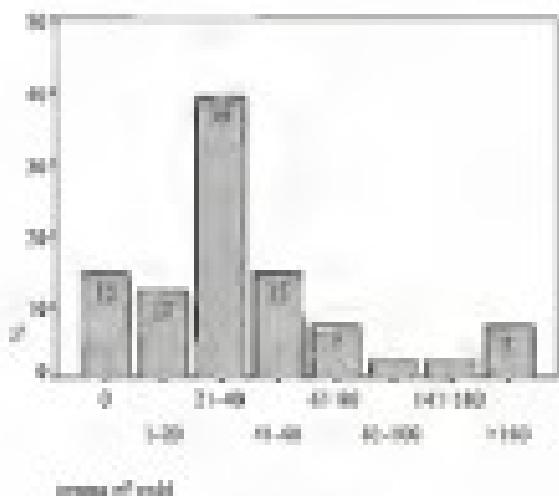


Figure 2-3 Amounts of gold (in grams) carried by people who worked previously as prospectors (N=111) across the income groups in the interview.

Table 2-1 Unadjusted number of small-scale gold miners and gold production in Burkina Faso over the past four years by different sources

Source(s)	Year	Estimated # gold miners in 2000	Estimated gold production (metric tons)
Le Point Burkina magazine interview cooperatives Wodji, Kpapocoupo, Da	1999	-	30
Chambre Nationale des Cooperatives de l'Artisanat et du Commerce	1999	15-18	10-12
Balafon, database gold (2001)	1992	-	24-29
UNDP, p. 41 (1999, extrapolated)	1997	15-20	6-10
UNDP (1997)	1997	15	6-10
Gouvernement Burkina Faso (Ministère du Plan)	1993	15	10 (low)
De Koker, Van Damme and De Wulf (1998)	1995	10-12	6

Table 2.1 Payment system and monthly earnings of several professionals in Bella Creek

Profession	Payment system(s) observed in the Bella Creek mining area	Monthly net total (gold)
Jobs performed by miners and men		
Gold/Machete miner	60-70% of gold extracted minus production costs (machete, transport of supplies, etc., sleep, food)	stage: 14-162 medium: 140
Cook	10 g per week (minerals, no 2 g per week (machete) = 10 g. Sleep fees, no other wages paid by boss	10 10 11, 20
Shop-owner	Salvo miners transport and acquisition costs Products are usually priced 1-10 times the prices in the city	100-1000 ^a
Transport worker	none	stage: 0-10 medium: 10
Jobs exclusively performed by women		
Miner's wife See-worker ^b	1 g/gold 1.5 g/minerals 8, 10 or 15 g/mg (job variable, more experienced) Jobs exclusively performed by men	10 1.5 8.5
Transport worker	10 g/hour of load (1.000 kg)	Sleeping
Transport All	1.5 g/15 kg transported (gold payment)	Sleeping
Transport Muleteer	2 g/25 kg transported (gold payment)	
Piñ Miners	1% g/gold extracted	stage: 14-162 medium: 40
Chefess	1% of gold extracted	stage: 20-221 medium: 20
Cook ^c	1 g/10 liter consumed (1.000 g) 20 g/hour of load (gold) (1.000 g)	stage: 15-180 medium: 10
Construction Worker	3% of gold earnings of each operator per ton consumed (fuel, labour and gold)	n.a.
All-round carpentry, construction	1 g/hour produced, 15 g for cleaning the camp; from woods, 1 g/m ² house cleaned with steel-saw (stage fees and other sleeping)	n.a.

^a The amount represents the amount paid in cash and credits. Because miners frequently do not pay their debts to shop-owners, real profits are much less. The estimate is based upon the information from two men who were exclusively shop-owners. Other shop owners had other primary jobs such as being a cook or a camp-hands.

^b Figures are estimates from authors.

Table 3-2. Estimated earnings of informal (jet workers) or (partly) mechanized small-scale gold mining by different structures (per person grams of gold per month)

structure(s)	time & place of field work	estimates of gold miners (g. of黄金/gold)
Himelick	1998, 1999, Bolivia, Ecuador	45 (150-75)
Vieira (1997)	1997, Suriname	45 - 120
Healy (1996)	1995 Puerto Rico/Saint Lucia/Haiti, Suriname	partly mechanized (2-3 persons), 15 - 30
Souza, Verissimo and M. (1996)	1990 Tapajós River	17 (low power), 15 (medium power), 30 (high power)
Holmstrom (1994)	1990-1991 Tapajós, Brazil	20 (gold)
Clancy (1995)	1990-1995, Maranhão, Brazil	17 - 21

CHAPTER 3 METHODS AND SAMPLE

Here I describe the general methods of data collection and analysis. I begin this chapter by defining small-scale gold mining and gold miners. I then describe the sampling methods and characterize the sample population. Here I discuss how I generated and analyzed lithographic data, quantitative data, and textual data. In later chapters I apply the methods presented only to those chapters. Definitions of important concepts and foreign words are listed in Appendix B.

Definitions

Small-Scale Gold Mining

The term small-scale gold mining has been used interchangeably with artisanal mining, village mining, informal-sector mining, and de Brazil-*antecedentes* (Clancy 1998, McMullen 1995, Schmid and Wood 1992, UN 1996). All these terms are used to describe mining that is performed informally with rudimentary methods. I will only use the term small-scale gold mining. Small-scale mining includes both manual mining and mining that makes use of pumps, sheer boats, and other mechanized equipment.

The Sustainable mining law defines small-scale mining as:

The environmental stewardship and exploitation of a natural deposit where miners make all resource and quantity decisions for economic mining by simple means and methods (Dobson 1-11, art. 3.6, Government of Suriname 1999).

The Geological Mining Service of Suriname applies the same small-scale mining to mining activity up to a concession smaller than 200 ha. These official definitions do not clarify the nature of small-scale gold mining. Therefore I use as a working definition of small-scale gold mining, gold mining that is characterized by:

- a. Inclusivity, large degree of independence of local legal and economic regulations implemented by the national government; and
- b. A mine owner that is not formally trained in mining and has a high educational background in general.

Even though efficiency and proficiency vary considerably among small-scale gold mining operations in Suriname, several features characterize all these operations: the absence or low standard of prospecting prior to exploitation, inefficient ore exploitation (mining and processing techniques) and high economic and health risks (Bent and Rasmussen 1997, Healy 1996).

Gold Miners

To answer my research question I needed to divide the world in gold miners and non-miners. Because to my knowledge, no other researcher has clearly defined gold miners or day-laborers, I developed a broad definition of gold miners that has served me well. I use the term gold miners to refer to anyone who is present in the mining camp, and is part of the mining industry or of the surrounding service economy. This definition includes not only job workers and camp-helpers, but also residents, wives, and

other people at and around mining camps. It also excludes the spouses of miners who visit the area, because they usually take food to others at stores, to sell, and perform small services for their husbands and others. It excludes people in the city who are not financially or socially engaged but are not physically present in the mining area.

I found the broad definition of gold miners most useful for several reasons. First, miners in the mining area typically perform different jobs simultaneously or in sequence. For example, people who were selling at one time could be found in the mining pit a week later. A narrow definition possibly excluded those people. Second, many mining tasks are shared, including mining, violence, drugs, and economic uncertainty. Therefore the most important decision for many Bolivians is whether to work in the mining area, rather than what job they will do. Several people came without a predetermined workplace; they selected a job on or outside the mining pit since they arrived in the mining area. Third, a narrow definition that only includes pit-workers and buyers excludes many women from the sample of miners. A broad definition of who are gold miners allowed me to investigate gender inequality in mines in mining, and to compare non-mining women with female miners.

Throughout the Oruro's local gold mines are called *pedroñeras* (pedroneras). Historically, this name was used for independent gold miners, who worked on the dismemberments of others in exchange for 10-15% of the gold extracted. Today pedroñeras has a negative connotation and gold miners do not identify themselves by this name. However miners refer to themselves as gold miners, the term that I use. I refer to Bolivian gold miners as *pedroñeros*, a name that is commonly used in Bolivia.

Sample

Sampling Methods

The absence of demographic and socioeconomic data on the Marques population and the high mobility of rural Marques prevented me from using random sampling, stratified by socioeconomic or demographic characteristics. Moreover, a random sample would not generate sufficient variance in the explanatory variables. For example, due to the small number of women in the working ages, a random sample would not include enough female interviewees to test the hypotheses. Instead I sampled purposively, interviewing the largest number of females whom possible. Purposive sampling allowed me to analyze the differences between female farmers and other women, and between female and male farmers. I ensured that the final sample was sufficiently varied in race, acceptance age, social or economic status, wealth, and other socioeconomic characteristics relevant to testing my hypotheses.

I conducted interviews in the national capital Paramaribo, in flood communities along the Tapanahony River, and in the Selle Creek mining area. In Nijpiba village and in mines, where I identified interview candidates by approaching people who appeared interested, I asked them if they were willing to participate in an interview. On other occasions the interview followed out of a spontaneous conversation with someone. I minimized the bias of approaching only the least suspect persons by making approaches with people who were too busy to participate in spontaneous encounters.

I found opportunities to talk by chance while helping out on the field or in domestic chores. In the working ages, the most productive day of the week was the *luna*, or

also day. On these days miners were not allowed to work and often bored and angry to sit. I found other occasions to speak with miners when mining machines had broken down, when people were waiting for the boat, when miners were temporarily out of work or in the case of merchants when there were no customers.

It was more difficult to identify Nylja in the city because they are one of many ethnic groups, and I could not easily distinguish them from city Croats or citizens of other nationalities. Given the tightly connected urban Nylja community, I successfully sampled most urban in the city. I started the process from different sources to prevent the sample from including only people from one single network of friends and family. The first person in each sequence was usually someone who I had met independently over the course of fieldwork.

Sample Population

The sample population includes male and female Nylja who are either gold miners and gold miners (Figure 3-1). More than half (57.2%) of the interviewees lived along the Tisza river in the area called *apo* (apό-strewn), primarily in the villages of Deszpotice and Blagovac (Figure 3-2). Another large proportion of Nylja (17.7%) lived in Paraszatice, and smaller numbers lived in Szentes (Greece) (3.7%), Balaton (Balaton) (3.2%), or in the coastal Danube region (6.9%). The Nylja are typically part of multiple households in different places. I classified people in the place where they spent most time.

The men and women in the sample have a similar distribution of ages. About a third (30%) of the people of both sex-groups are between 16 and 21 years of age. A majority of the men (57%) and women (50%), are in their twenties and thirties. Below

percent of women and 10% of men are over 60 years of age. Twenty-seven percent of the Malays in the sample have a partner. The number of children averages 2.5 ($SD=0.4$), and ranges from 0 to 26 children. The 24 children belong to a man with three wives who also has children with other women. The number of household residents varies mostly between 4 and 28, with an average of 4.4 ($SD=2.9$) people per household.

There are large differences in human capital between Malays women and men, as well as between gold miners and others (table 3-1). Here I only report the significant differences unless indicated otherwise. The large standard deviations imply that there is much variation, within each sex and occupational group. On average, women complete only 3.3 years of formal education and use 5.6 years ($t=4.58$, $p<0.001$). Almost half of the women (49%) and a fifth of the men (27%) have no formal education ($\chi^2=29.47$, $p<0.001$). Among both men and women, gold miners are more highly educated than non-miners (but these differences are not significant at the 5% level). About two-thirds of the interviewees' parents, 71% of fathers and 59% of mothers, had received any formal education.

Almost all men (94%), particularly among the miners (98%), know how to tell time. In contrast, a quarter (27%) of women are not familiar with western time calculations (χ^2 between men and women = 16.94, $p<0.001$). The figure is even higher (41%) among the non-mining women (between mining and non-mining women, $\chi^2=6.34$, $p<0.05$). Men (97%) know more about money than women (85%), ($\chi^2=12.24$, $p<0.001$), but both groups compare poorly to school literacy rates of 34% and 35% for men and women (VII) (1997). Women also speak on average fewer languages than men

(2.0 versus 2.6, $p=0.48$, $p=0.00$). Few women speak the national language Dutch (47%) compared with 71% of men ($\chi^2=25.34$, $p<0.00$).

As expected by members of either sex group, gold miners are disadvantaged. On average, miners have had more formal education ($p=0.18$, $p=0.00$) and are more likely to be literate ($\chi^2=9.84$, $p=0.00$), know how to read maps ($\chi^2=13.50$, $p=0.00$), and speak Dutch ($\chi^2=17.14$, $p=0.00$). Formal education, literacy, mathematics, and the ability to read maps are signs of increased acculturation. The data suggest that gold miners and men are, on average, more acculturated than women and women.

Sample Population Gold Miners

The sample of gold miners includes people with different positions in the mining area (Figure 3-1). I only present the percentage of people in their primary occupation, excluding services that are typically performed in secondary jobs, such as washing clothes. Free-workers may be under-represented in the sample because I usually found them occupied during the entire day. Most men and women work more frequently than to spend time. I assume that in reality, Ndebele per-workers make up just over half of the Ndebele mining population in Bell's Creek. For the other occupational groups, the proportional representation displayed in figure 3-3 reflects the population in Bell's Creek.

A fifth (22%) of the Ndebele miners reported working in mining. Because of the high economic insecurity, I could find fewer working as per-workers to pay for the rest of a family member. Cooks and waiters both represented about 11% of the mining population, and these jobs were somewhat combined. Fewer people were cleaners, delivered transport services, and did all mixed jobs. Women did many jobs. Yet because

they combined jobs and resided in the village, was far shorter periods than men, the number of Nylja women in Kello-paasi at a given time was always low.

Sample Population: Non-Men

Most non-men in the sample lived in the finance, primarily in the villages of Drankalbygg and Norrskär. About 20% lived in Färnebofjär. The group of non-men included twice as many women ($N=40$) as men ($N=17$) because women dominate the population in these communities. Non-men did various jobs. Women were mostly subsistence farmers (22%). Men preferred less frequently the agriculture, only 7% of men practiced subsistence agriculture, and 18% had full-time farming. Other women (38%) and men (17%) informally sold goods and services. More than a quarter of non-men men (27%) and 15% of women were civil servants, and about half of men (51%) and women (53%) worked in other forms of wage labor, mostly in the city. Fewer non-men were farmers (3%) or non-farmers (7%) or lived off pensions (3%) or penning income (men) (0%). Many women (17%) reported to depend on others, mostly a husband or unaffiliated kin.

Methods

Here I describe the general research methods that I used to collect and analyse data. In table 3-2 I provide an overview of the main questions I addressed in each chapter of the dissertation, and of the specific methods that I used to answer these questions. I also summarize what type of data each of the methods generated as relative to the

questions. The questions are ordered according to their appearance in the data chapters 10 through eight. Below I discuss the methods in more detail.

Ethnographic Methods

I used several ethnographic methods, including life histories, ethnographic interviews, semi-structured interviews, and participant observation and observations. I conducted primarily all interviews in Ndyuka and occasionally, upon request, in Dutch. The life histories of elderly Ndyuka helped me understand the historical context in which the present developments take place. Ethnographic interviews revealed a picture of the daily lives of Ndyuka women and men today. In 2006, I also recorded my in-depth conversations with two women. Because these people were uncomfortable with tape-recording, I recorded all other interviews by hand. All interview names in the dissertation are pseudonyms.

Participant observations and conversations were related to my qualitative understanding of Ndyuka life. In the seven villages, I participated in grocery, talks, discussions, and conversations during daily activities such as grocery stores, picking produce, and working in the rice田. Despite my shyness of the traditional rice田, this place proved to myself to be where women openly discussed personal and women issues, marriage and love. In the mining camp, I noticed conversations involve around plays of chess or referred to relatives during off-work hours. Like Cleary (1990), I found the gold mining area as excellent research setting from the ethnographic point of view. The mining men often talk to me informally and if nothing else, conversations with and observations of a foreign anthropologist in camp at least a dozen times. I found miners pleased with the respect in their lives and they asked me so many questions about the

Netherlands and the US as I asked them about their lives and ideas. Both in Nijpels village and in Gor (among others) was welcomed with curiosity and generosity and numerous people shared food and shelter.

I also used structured methods to collect and analyse ethnographic data. In chapter five I use ethnographic discourse tree modeling to identify main justifications for value stating in and among. An advantage of discourse tree modeling over non-ethnographic types of discourse analysis is that it allows the decision-makers to say what they think is important. Ethnographic modeling can also integrate responses from different interviewees factors such as ethnicity, consciousness, and power. Unlike other ethnographic methods, discourse tree modeling allows for prediction and extrapolation of the results to a larger population of interest. Another structured qualitative method that I use is a Likert scale to measure individual and subjective. Chapter seven contains a discussion of how I constructed and applied the scale. I explain the tools of validity and reliability of the Likert interview-scale in Appendix E.

I used ethnography to develop my hypotheses and place my analyses in a sociocultural and historical context. Throughout the dissertation I use qualitative data to interpret quantitative results, and to provide explanations why certain social mechanisms in the interview of history. I omit ethnographic details that do not help to answer the research questions in a clever way. For more detailed ethnography about the Maroons the reader is referred to fully Peet's book about slaves in Surinam society (1990), the analysis of Nijpels village by Thiebaud Van Vliet and Van Pelt-Vening (1981), and studies of social stratification and social change among the Maroons (Drijver and Sauer 1981) and the Cacaos Nijpels (Blijlevens 1979). Fieldwork for the above studies was primarily

conducted in the 1970s, but much ethnographic work on the blacones is sparse. Polak and Theo de Vos (1997) collected in-depth interviews with refugees and other Mexican victims from the *centro* area. Richard and Sally Price combine data from their Survey of Fieldwork, among especially the *barriadas*, to document developments in Mexico City (1997). My analysis is the only recent in-depth study about the *Polacos*, which have been changed dramatically over the past two decades.

Quantitative Analysis

To collect data for quantitative analysis, I composed a survey on socioeconomic characteristics and living-related information. I adjusted the questionnaire after the first few interviews in the field, and later perfected the wording of the questionnaire with the help of a Mexican key informant in the city. The final survey included the following eight sections:

1. Personal data
2. Household composition, pooling and labor
3. Health
4. Assets, income, resources
5. Time allocation
6. Money in a risky economy
7. Money experiences, and
8. Perspectives on the future

Appendix D contains the entire survey in English. The interview lasted approximately half an hour, which was the maximum time that people were willing to spend answering

structured questions. I typically obtained additional information or clarification in a less formal setting immediately after or before the interview.

I use bivariate and multivariate techniques to test hypotheses. The multivariate models include ordinary least squares, probit, and tobit regressions. I will clearly distinguish between theory and the testing and interpretation of the coefficients when I use the quantile regressions. I will discuss econometric problems and the way I dealt with them in the separate chapters.

Archived Research

I collected archival data from numerous sources in Suriname, the United States, and the Netherlands, where many historical and current records on Suriname are kept. Statistics on macroeconomic historical trends and its social and political indices are based on secondary data from the Central Bureau of Statistics in Paramaribo (CBS), the World Bank, and the International Monetary Fund.

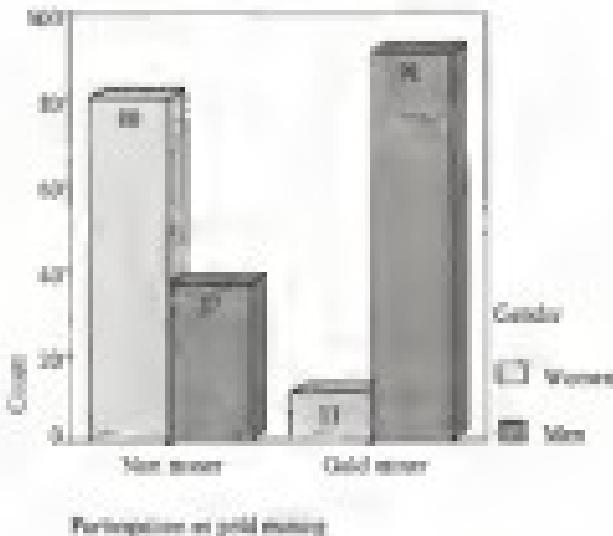


Figure 3-1 Number of male and female gold miners and non-miners in the sample population ($N=211$)

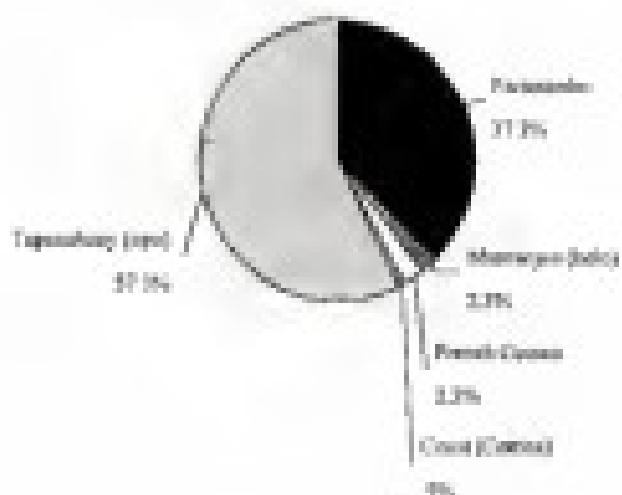


Figure 3.2: Area of residency of the sample participants ($N=210$)

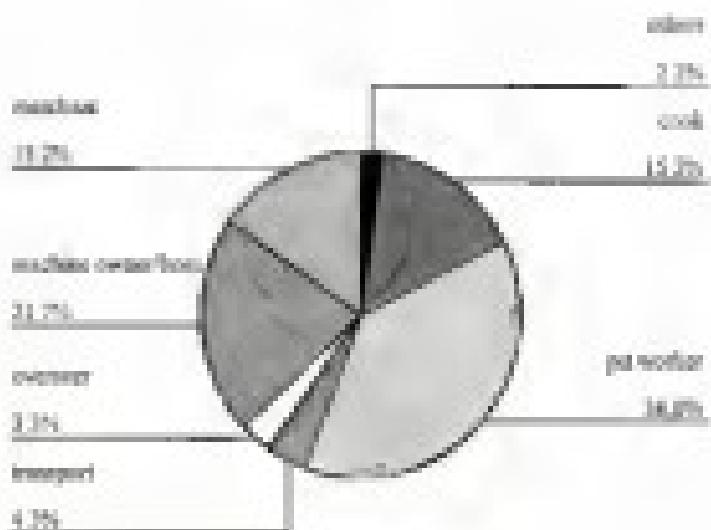


Figure 2-1: Percentage representation of different professions performed by gold miners in the study sample ($N=182$)

Table 3-1. Human capital of Chilean men and women, relatives and nonrelatives

	Sample	Meaning sites	Other sites	All sites	Mining situations	Other situations	All situations
N	214	91	12	123	11	80	91
Reference mean (SD)	4.7 (4.0)	5.6 (3.2)	5.6 (4.9)	5.6 (3.4)	4.6 (3.7)	3.1 (3.4)	3.3 (3.6)
median	3.0	3.0	3.0	3.0	3.0	0.0	3.0
range	0-17	0-19	0-17	0-17	0-11	0-14	0-18
Reference range	0-10	0-11	0-10	0-11	0-10	0-10	0-10
Overlap	100%	100%	100%	100%	100%	100%	100%
Agreement	100%	99%	100%	99%	100%	100%	100%
Number of languages sites (SD)	2.8 (1.4)	2.5 (1.1)	3.1 (0.9)	3.4 (1.2)	3.1 (1.0)	1.1 (1.2)	2.3 (1.2)
median	2.0	2.0	2.0	2.0	2	2.0	2.0
range	1-7	1-6	1-7	1-7	1-6	1-5	1-6
Spoken Dutch	100%	99%	100%	99%	100%	100%	100%

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Case	Question	Response	Case	Question	Response
1	What would be the best way to prevent a child from getting into a car accident?	Use car seats, child locks, and supervision.	2	What are some ways to prevent falls in the elderly?	Use grab bars, non-slip mats, and good lighting.
3	How can we prevent fires in the home?	Install smoke detectors, use fire extinguishers, and keep flammable materials away from heat sources.	4	What are some ways to prevent foodborne illnesses?	Wash hands, cook food thoroughly, and store food properly.
5	How can we prevent drowning?	Supervise children around water, use life jackets, and teach swimming.	6	What are some ways to prevent heart disease?	Exercise, eat healthy, and avoid smoking.
7	How can we prevent cancer?	Avoid tobacco, eat healthy, exercise, and get regular check-ups.	8	What are some ways to prevent mental health issues?	Seek help if you're feeling overwhelmed, exercise, and stay connected to others.
9	How can we prevent obesity?	Eat healthy, exercise, and avoid sugary drinks.	10	What are some ways to prevent dental problems?	Brush and floss daily, eat healthy, and see a dentist regularly.
11	How can we prevent eye strain?	Take breaks, use eye drops, and wear glasses if needed.	12	What are some ways to prevent hearing loss?	Avoid loud noises, wear ear protection, and use hearing aids if needed.
13	How can we prevent skin cancer?	Wear sunscreen, avoid tanning beds, and use protective clothing.	14	What are some ways to prevent osteoporosis?	Exercise, eat calcium-rich foods, and take supplements if needed.
15	How can we prevent diabetes?	Exercise, eat healthy, and avoid sugary drinks.	16	What are some ways to prevent Alzheimer's disease?	Exercise, eat healthy, and stay mentally active.
17	How can we prevent heart attacks?	Exercise, eat healthy, avoid tobacco, and manage stress.	18	What are some ways to prevent stroke?	Exercise, eat healthy, avoid tobacco, and manage blood pressure.
19	How can we prevent lung cancer?	Avoid tobacco, eat healthy, and exercise.	20	What are some ways to prevent liver disease?	Avoid alcohol, eat healthy, and avoid certain medications.
21	How can we prevent kidney disease?	Stay hydrated, eat healthy, and avoid tobacco.	22	What are some ways to prevent gallbladder disease?	Exercise, eat healthy, and avoid tobacco.
23	How can we prevent hepatitis C?	Avoid tobacco, eat healthy, and avoid certain medications.	24	What are some ways to prevent hepatitis B?	Avoid tobacco, eat healthy, and avoid certain medications.
25	How can we prevent HIV/AIDS?	Avoid tobacco, eat healthy, and avoid certain medications.	26	What are some ways to prevent tuberculosis?	Avoid tobacco, eat healthy, and avoid certain medications.
27	How can we prevent hepatitis C?	Avoid tobacco, eat healthy, and avoid certain medications.	28	What are some ways to prevent hepatitis B?	Avoid tobacco, eat healthy, and avoid certain medications.
29	How can we prevent HIV/AIDS?	Avoid tobacco, eat healthy, and avoid certain medications.	30	What are some ways to prevent tuberculosis?	Avoid tobacco, eat healthy, and avoid certain medications.

CHAPTER 4 ZOOMING OUT: DISTANT FACTORS DATING THE GOLD AND GOLD-SILVER

Anthropologists have long studied households and communities but they increasingly recognise that local people are influenced by and in turn influence larger-scale processes (Angepa, Fox and Velasquez 1996; DeWach and Flynn 1993; Munn 1999; Painter and Dutcher 1995; Schmand and Wood 1991; Sponeri, Bailey and Headland 1996). Zooming out from the household to the macro scale reveals how distant forces may influence and affect local resource choices. Here I step back from the Ngapu community to analyse and model the international and national developments that have contributed to the growth of the small-scale gold mining industry in Suriname.

Central Questions

In the conclusion to the book entitled *The Social Control of Environmental Destruction in Latin America*, Dutcher (1995) discusses how large-scale forces affect local resource use decisions. Dutcher explores unsustainable land-use as a product of inequality at international and national levels. He argues that in Central America environmental destruction makes more than the environmental exploitation of ecologically vulnerable areas. As a result local people have less resources available and suggest no sustainable commercial land-use practices.

By contrast, Daham argues that in South America national forces are more important. National inequality lowers the standards of living, and access to resources of unprivileged groups. These groups respond by using marginal lands over-increasing and employing other means of unsustainable resource extraction. International and national forces mutually reinforce one another, but in specific contexts may better implement local behavior than the other. My related questions are:

1. Do national or international forces better explain why small-scale gold mining boomed in Burkina Faso in 1997?
2. What is the relative impact of uncoordinated international and national processes on changes in the local mining population?

Approach and References

Globalization, urbanization, and industrialization are making the world more interconnected and interactive. Communities that were previously relatively isolated are now increasingly exposed to people, commodities, and world-matters from outside. As a result, the analysis of national and global developments has become crucial to understanding the local realities in which people live and make decisions. Interactions between larger and smaller scales include diverse socio-cultural, political, ecological, and economic processes, and have temporal dimensions (Witten 1996; Boyce 1992, 1994, 1995; Headland 1991; Peluso 1992). For reasons of brevity I focus here only on selected economic and political links at spatial scales.

I take an unconventional approach to the study of macro-social level interactions by coupling qualitative documentation with time series regression analysis. This approach allows me to identify what processes are more important than others and to

assess the relative impact of selected indicators on the Shunzu mining boom. My study contributes to methodology for swiping macro-micro level analysis, and to a better understanding of gold mining in Shunzu. In addition, identifying the large-scale forces that are driving gold mining may inform public policy that can curb the impact of these drivers forces on the lives of local people. Such policy might encourage miners to produce their ore more sustainable than mining.

Competing Hypotheses:

I use the model of Bechtel (1999) to test two hypotheses about the relative importance of international and internal factors in producing gold mining. Emphasizing the importance of international markets, Hypothesis One

- (1) By decreasing the profit and production costs of gold mining, an increased market price for gold and oil are driving the local participation in gold mining in Shunzu.

Challenging with the conventional market model as a model that theories the political and economic processes within Shunzu campaign small-scale gold mining, I hypothesize that:

- (2) Economic and political stability at national level are driving the local participation in gold mining in Shunzu.

The competing models do not cover the range of possible explanations and are not mutually exclusive. A third and a fourth option, i.e. that a combination of models, or neither one adequately explains the gold rush.

Regression Model

I test the hypotheses with an ordinary least squares regression (OLR) to estimate the causal effect of international and national variables on the total number of small scale gold miners. The two hypotheses require different explanatory variables.

Hypothesis 1 predicts that miners respond to international commodity markets. I represent international commodity markets by the international prices of gold and oil, which determine the profit and expenses of a mining operation. I expect that a rising price of gold and a decreasing price of oil encourage small-scale gold mining. I use indicators of national economic and political instability to test the second hypothesis.

Consumer prices and unemployment represent economic instability. I use an indicator of the country's openness to international trade to approximate political stability. I predict that consumer prices and unemployment positively relate to the number of small scale gold miners, and that openness (political stability) negatively associates with mining.

Section 4 discusses the variables I will discuss what is known about the size of the small-scale gold mining industry over the past decades. The subsection will help the reader relate the changes in the variables described below to changes in the small-scale gold mining industry. The small-scale gold mining industry seems to have grown since the early 1980s. The last official resource of annual gold production dates from 1983 and is 187 kg. Today, the annual gold production in Shandong is estimated to have reached a plateau at approximately 12,000 kg. The present annual gold production exceeds the maximum production during the previous gold rush by more than five times.

Explanatory Variables

Here I operationalize the explanatory variables and qualitatively discuss why it appears specific variables to impact small-scale gold mining. In the next section I will explain the dependent variable that I created to represent the local participation in gold mining. The variables are defined in table A-1, summary statistics appear in table A-2, and the raw data are presented in Appendix B.

Price of Gold

I consider the price of gold for two reasons. First, gold is the international currency that best suits a test of Dethmar's environmental market model for the case of Germany. Second, several researchers have argued that a rise in gold prices encourages informal mining (Clancy 1998, McMillan 1999, Speerle 1997). Their argument is based on the observation that small-scale gold mining became active again in the early 1990s, when the inflation-adjusted global price of gold rose (figure 4-1). The case of Germany casts doubt upon the theory that rising gold prices reduce gold mining. Real prices of gold in US dollars and German guilders declined after 1971, with the exception of a rise in the German gold price in 1983 following monetary adjustments. In contrast to what would be expected during falling gold prices, the German mining population grew in the 1980s and 1990s. Previous older researchers have emphasized the price of gold and because of its theoretical importance, the variable remains part of the analysis. I exclude the price of gold as the log value of the inflation-adjusted price of gold in German guilders. A lack of historical price data on other relevant commodities prevents me from analyzing the impact of the relative price of gold.

Prius of Fuel

The price of fuel should affect the expenses of gold mine owners, who use gasoline for transport, the operation of mining machines, and generators that deliver power for telephones and refrigerators. The large variation in fuel use of different mining enterprises, coupled with the sparse written documentation of expenses, prevented the precise calculation of the relative contribution of fuel expenses to the cost structure of mining operations. I used the detailed data from one highly mechanized mining operation at Delta Creek, to estimate the relevance of oil/gasoline for miners. In table 4-2 (column 2) I estimate that the operator spent about 2,790 US\$-each month on fuel, which amounted to 80% of his monthly variable costs. Given an average gold production of 3 kg gold/month, the equivalent of 11,600 US\$, approximately a fifth of the total production value was invested in fuel. Casual conversations with other mine operators implied that they spend a similar proportion of their gold production on fuel.

The price of oil fell steadily in the early 1980s (figure 4-2). Although real world oil prices recovered soon after 1985, real oil prices in Barringer peaked long gone down, in fact a little in 1983. The price of oil estimated after that year has steadily fallen again due to an increased world production competing with weak demand. By lowering production costs, low oil prices may have made gold mining more profitable. The price of oil is evaluated as the log value of the inflation-adjusted price of oil at Barringer's peak.

Political Instability

Without mentioning have argued that national political instability and inequality impinge the sustainable use of resources by local people (DeWitt and Pinto 1983).

Parker and Shadforth eds. 1995; Sennett, Bailey and Bradford eds. 1996). I documented in chapter two how in Suriname military dictatorship (1980-1981 and 1982-1987) and the miners' war (1988-1992) uncontrolled and generally unvoiced the Ndyuka. It is likely that these factors at least stimulated the participation of Ndyuka in gold mining. I measure the intensity of political instability by the economic openness, following the example of Boba and Deacon (forthcoming). Openness is calculated as the ratio of imports and exports divided by the Gross Domestic Product (GDP), in percent:

$$\text{Openness} = \frac{\text{Imports} + \text{Exports}}{\text{GDP}}$$

In economic terms, openness measures the ratio of the value of international trade to the value of the national economy. The logic behind the proxy is the political stability index is usually based upon the number of arrests and obstructing unregistered trade.

A graphical representation of how openness to international trade developed over time helps judge the validity of this variable to measure political instability in Suriname (Figure 4-3). Suriname became politically less stable after the military coup of 1980. As expected, openness decreased continuously following the military coup and throughout the period of dictatorship (1980-1992). After the return to democracy (1992), the country becomes rapidly more open due to recovery of trade relations with the Netherlands and the return of large-scale mining and logging enterprises. The fluctuations in openness since 1995 are less clear. They may partly reflect the return to power of the political party of ex-dictator Bouterse, and the disruption of Surinamese trade relations with the Netherlands again (Pap). Because the trend in openness is associated with political events I conclude that openness is a good indicator of political stability in Suriname.

Inflation and Consumer Prices

Several researchers have identified a positive relation between inflation and the severity of small scale gold mining (Chauzy 1998; MacMillan 1993; Baumgartner 1993). In Burkina, annual inflation rates began to rise during the inner war (1990-92) and continued to increase thereafter (partly due to a devaluation effect following the collapse of the franc zone (Figure 4-4). Meanwhile the legal imports of consumer goods stopped almost entirely, creating shortages and a thriving black market (Oshikoto 1991: 158). Shortages coupled with high inflation caused consumer prices to rise (Figure 4-5). Costs of food items increased ten-fold between 1990 and 1997, severely impacting the quality-of-life. From May 1998 to May 1999 consumer prices increased by 103% (BDF 1999), and in May 1999 alone, the Burkinafaso franc depreciated 40% against the US dollar (IMF 1999). I include inflation as the log value of the consumer price index, because this measures how a direct impact on the daily lives of people.

Unemployment

It is likely that people became paid miners when the availability of other jobs decreased. Unemployment rose following the 1987 military coup and peaked at the end of the inner war (Figure 4-6). Unemployment rates had remained under 1% of the economically active population throughout the 1970s, reached over 20% by the late 1980s. The explanatory variable unemployment is included as the percentage unemployed of the economically active population.

Dependent Variable

The dependent variable is the number of total small-scale gold miners. In absence of annual data on the mining population, I used local survey data to create the dependent variable. I linked the Ngapuhi with mining experience (0=1 NO when they had not earned gold money and, if applicable, when they had spent money). Analysis of the number of people who are added to the mining population annually (paneling analysis) shows that many Ngapuhi became gold miners during military ingress (1845-1847 and 1863-1867), the Waikato war (1863-1865), and its aftermath (Figure 4-7). Less than a fifth (17%) of the Ngapuhi with mining experience had begun gold mining before the military ingress of 1845, and almost a third (31%) of survey participants first entered the mining fields during the invasion year (1863-1865). Increased accessibility of the unoccupied northern areas of Irving after 1863 may explain the large number of Ngapuhi entering the mining fields immediately following the war (1865). The relatively large proportion of people who entered before 1873 (18%) is due to the large time span that has transpired (10 years) in comparison to the other periods (3 years).

The number of total gold miners in a given year may not adequately represent the development in the existing mining population at a given time. The measure ignores that people usually stay for several years. I solve the problem by calculating the cumulative number of miners in a given year; that is, the total number of miners in the previous year plus the number of newly entered miners. Because people leave mining as well, I subtract the number of people who left gold mining in a given year from the cumulative number of miners in that year. Because the macroeconomic data only goes back to the

early 1990s, I limit the analysis to 1970–1998. This recent time span minimizes problems of bias from memory errors.

A major selection problem is attrition attrition (people die or move away over time). I accounted for attrition in the following way. I first assessed what proportion is removed each year from the Nijlaka population. This gives expected data on the age distribution among the Nijlaka. However, the population pyramid for the entire Surinamese population does not differ much according to ethnicity (Adel 2000). Because the age-distribution in the primarily rural Nijlaka population is likely different from the age-distribution in the urban population, which is mostly urban, I analyzed the age distribution in my survey sample (N=218). The Nijlaka age-distribution is likely to have the pyramidal shape that characterizes poor countries, with large numbers of young people and few people in old age groups. The sample only includes people over 15 years of age.

The age distribution of the sample does not follow the expected population curve exactly (Figure 6.8). A few reasons may explain why I have fewer observations than expected for the youngest age group. A proportion of the Nijlaka in the ages 20–30 may have been killed or left the country during the recent war. People 15–20 years of age were underrepresented in the sample because they typically start entry to schools in the city when they follow secondary education. Furthermore, young men are likely to migrate. After the age of 30 the population distribution follows the expected curve. Except for the youngest age group (15–20), solid data seem to reflect the real age distribution in the Nijlaka population. I assume that the population pyramid has remained relatively constant over the past 20 years.

The second step in the estimation procedure was to calculate the percentage of people in the sample population who were old enough to be gold miners in any given year (1973-1993). Because gold miners are typically over 15 years of age, I calculated what proportion of the sample was at least 15 years of age in a given year. For example I calculated how many people were at least 15 in 1973 by counting how many people in the sample were born in or before 1958. Twenty-nine percent of the people in the sample were at least 15 in 1973 and could have been miners in that year. This suggests that 11% of the people who could have been miners in 1973 died or moved away.

The observed number of gold miners in a given year was corrected for attrition by multiplying their numbers by a factor that made up for the missing people. The factor was calculated as a hundred percent, divided by the percentage of the population that was over 15 in a specific year. (For 1973 the correction factor is 100/79, which equals 1.3.) In that year, there was only one gold miner among all people in the sample who were over 15 and could have been miners (29% of the sample population). To correct for attrition, I multiply the observed number of gold miners in 1973 (0) by 1.3. I thus estimated that 1.1 out of 219 people in 1.5% of the Nujita population, were miners in 1973. From the above follows the equation that I use to calculate the dependent variable, the standing number of miners in a given year:

$$\text{MINt} (t) = [\text{MINt-1} (t) + 0.01 \cdot 219] \cdot 1.397910$$

in which:

$\text{MINt} (t)$ = Standing number of miners in year t

$\text{MINt-1} (t)$ = Standing number of miners in the year prior to t

$N(t) =$ Number of people who currently entered gold mining at year t

$N(t) =$ Number of people who exited gold mining at year t

$p(t) =$ Percentage of people in the sample who were at least 19 years of age in year t

The chart suggests that the mining population has grown steadily since independence (1970), with plateau in growth in the late 1970s, and during the initial years of the miners' war (1982-1983) (Figure 4.4). The stagnation in gold mining at the onset of the miners' war (1982-1983) can be explained by the insurability of the miners during those years. Yet few miners have died (their numbers increase again from 1990 onwards). I use the log version of the running number of miners as the dependent variable.

Econometric and Data Problems

Several problems characterize the data. First, many statistics for Burkina are inaccurate. For example, during my fieldwork in Burkina, the black market gold price was about 10-30% higher than the official price of gold set by the Burkina Central Bank. As a result, the inflation-adjusted price of gold in Burkina probably only reflects well what gold miners received for their gold at market. A similar discrepancy between official figures and reality characterizes inflation data; bank market exchange rates were up to two times higher than officially reported rates. Because better data for Burkina are not available I calculate the Burkina price rates using unadjusted prices, and assumed exchange rates and inflation rates. Second, even accurate data may not

measure the phenomena at hand. For example, national unemployment rates badly represent the situation between the data points in formal labor at the urban area. Most Mexicans live in the rural and perform informal labor and are not accounted for in national statistics.

An econometric problem is multicollinearity. Some explanatory variables are highly correlated with one another, including wages and CPI ($r=0.94$, $p<0.001$), and the price of gold and the price of oil ($r=0.93$, $p<0.05$). Correlations between wages and oil prices ($r=0.73$, $p<0.001$) and between unemployment and gold prices ($r=-0.86$, $p<0.001$) are likely an artifact of chance. It is possible to correct for multicollinearity by dropping one of the variables. However, this procedure would increase multicollinearity and cause specification bias and is therefore undesirable.

I used the Durbin-Watson test to detect autocorrelation and found no significant results ($p>0.15$). I correct for potential autocorrelation by decomposing the time series into two different dynamics: the model is that the original model analyzes the general trend over time, while by regressing the residuals, the demeaned model analyzes annual fluctuations. Despite the possible presence of autocorrelation, the original model may be more accurate than not if it is likely that markets do not respond to annual political or economic changes but in general trends over time. The small sample size (N=22) supports the significance of the results.

Results

The results appear in table 4-4. I present both the uncorrected original model and the detrended model. As expected from some prior analysis, the predictive value of the original model is high ($R^2=0.97$), and lower for the detrended model ($R^2=0.67$). Unsurprisingly, prices of gold and oil are not significant in either effect size or statistical power, and their effect-direction is opposite to what was predicted. For each percent increase in the price of oil, a mining business costs more expensive- the mining population is estimated to grow by 0.12% [$\beta = 1.12$, $p < 0.21$]. A doubling of the price of gold, and thus in the profitability of mining, is predicted to cause a 25% decrease in the number of miners ($\beta = -1.04$, $p < 0.27$). In the detrended model, uncorrected market prices have even less statistical power.

Of the second indicators, only the economic policies are statistically significant. The CPI and unemployment have the expected positive signs and are statistically strong in the original model. Each 10% increase in consumer prices is predicted to cause a 2% growth in the mining population ($\beta = 0.35$, $p < 0.005$). It is estimated that 1% increase in unemployment will cause a 2% increase in the number of local gold miners ($\beta = 0.2$, $p < 0.03$). In the detrended model, CPI and unemployment, continue to present the right signs, but lose statistical significance at the 10% level ($\beta = 1.66$, $p < 0.12$ and $\beta = 1.92$, $p < 0.07$, respectively).

In contrast to what I predicted, openness (induced volatility) is positively associated with gold mining. The statistical power of the ratio of openness is weak in both models, especially in the original model ($\beta = 0.16$, $p < 0.47$). In the detrended model,

per standard deviation increase in the ratio of open pits is estimated to decrease the mining mining population by 0.3804 ± 0%, a negligible effect (Table 14, p.9-18).

Discussion

International Commodity Markets

The estimated overall effect of international market prices is small, statistically weak, and has a direction that is opposite to what was expected; people have become small-scale gold miners despite the gold price was dropping, and production expenses were rising. These findings contrast typical expectations and existing theories of the gold rush in Brazil (Cherry 1996; MacArthur 1995). The limited explanatory power of gold prices may in part be due to the discrepancy between the official present price of gold and other markets, however the local gold price mostly.

The lack of explanatory power of international commodity markets does not imply that formal dealers of *Serviço* have not influenced the gold rush. My observations and conversations with people in the *Serviço* mining world, suggest that the migration of entrepreneurs to *Serviço* has stimulated small-scale gold mining in *Serviço*. Contractors are estimated to make up three-quarters of the mining population and have introduced more modern and efficient mining techniques. Technical migration from Brazil to illegal and goes unreported. The effect of international migration on the local participation in mining could not be analyzed with quantitative methods.

Political instability

Quantitative analysis suggests that political instability in Burundi did not impact small-scale gold mining. The informal mining industry grew steadily in terms of political violence, but continued to grow when the state returned to democracy in 1993. The index of openness, which I used as an indicator of political stability, is not significant and has a sign opposite to what I predicted. In short, the evidence suggest that political unrest did not encourage Mijikila to become miners.

The second finding contrasts with Mijikila's experience and work by other scholars. Data from these sources indicate that the intense war (political instability) caused the present marginal position of the Maronites in Burundi, which in turn has encouraged mining. In a work entitled *Religious, Rebels, and Other Maronites of Eastern Burundi (1990-1993)* (1993; my translation), Polani and Thébaud Van Velzen analyse stories of Mijikila war victims and human rights reports. They discuss the killing and torture of hundreds of Maronites, the destruction of Maronite villages and agricultural plots, the robbery of Maronite savings, and the demolition of indigenous churches by the military. Nearly 10 000 refugees, primarily Maronites, fled to French Congo (Tremblay 1990). Thus (s)he argues that the intense war perpetrated traditional division for the Maronites to protectors and persecutors by-city people. It has been suggested that envy for the relative prosperity of the Maronites in the 1980s exacerbated the malcontents of Maronites by Christians during the war (Polani and Thébaud Van Velzen 1993, Pison 1995).

In interviews Mijikila recognises that the mineral war played a significant role in determining their social, economic, and social opportunities or security. Many local schools closed during the conflict, leaving a generation of young Maronites without

experience (Bosma and Deurloo, 1996, 2001). Many Ngaju students from Parawali were speaking their native language in the forest when the fighting started, preventing them from returning to school. In the interior, young Ngaju children had few options other than mining for gold. After the war, many had reached the age to earn money or had become parents in the battle. I was in the 10th grade of elementary school [in the city], when the fighting started. Then we came to Ngaju university [the forest]. I found a husband, and I got children.' The youngsters were back to school.

Before the conflict over many Ngaju men worked for the government. Eighty-seven of the Ngaju in my survey sample (52/61) had at one time worked for the government. Of these 87, 42% had been employed by the government. The percentage compares to the rates found for urban Indians in Manaus in the 1990s, 21% (Barrientos and Norman 1998: 122), and to figures recorded by Lauer (1980) for Ngaju Indians in the early 1960s. Ngaju men worked for the Development Mining Service (ODMID), the Bureau of Hydroelectric Power (BHPC), the Bureau of Public Health (BPH), and civilian companies, the Samarco Andor Company (SAC), and other jobs that required activities in the interior. They cut forest trails, took measurements, measured deposits, and worked in geological surveys and bureaus for geological mapping and research. A 63-year-old man who

I worked on Ben Creek for the government. I transported goods by canoe and cut trails. [In the Ben-Creek region] I also built the Chikapanga dam and assisted the police and miners. I stayed there for long with my wife 12 years, and had five children there. I also worked for 20 years for the mining company.

Many older men had experience in diverse public jobs, mostly in the interior.

Government employment was popular because it was prestigious, paid relatively well, and usually combined with permanent jobs. Other Ngaju in my sample had worked in unskilled labor such as carrying or cleaning (12%), and yet others reported experience in

skilled jobs (e.g. teacher, nurse, 12%), construction (7%), service industries (7%), and informal labor (7%).

The war eliminated public jobs in the forest, as well as many jobs in the lumber industry and timber industries and in construction. However, the data do not show that the war was the main cause of job loss. Many Ngajuans (71%) reported losing wage labor during the war, but many more (81%) lost or quit formal employment in the years following. Several Ngajuans mentioned discrimination and being "treated second" as reasons to quit formal labor. The negative stereotypes about Maroons and their low educational levels limit their competitiveness in the formal labor market. Gold mining is a way to earn steady rents independent of any people.

In summary, the impact of political instability on small-scale gold mining is ambiguous. The interior war (1996-1998) placed the Maroons -especially the Ngajuans- in a marginal position and destroyed the social, educational, and economic infrastructures in the interior. However, the return to democracy did not encourage people to leave mining. On the contrary, more people have entered the mining fields since 1998. I argue that the long-term economic and social impacts of the interior war are to blame for the growing number of gold miners in recent years. These impacts include poverty, ethnic discrimination, and the poor education of Ngajuans. A statistical test that compares the periods before 1998 and after supports this argument. There is a significant break in the mining function before and after 1998 (Chow test, $F=18.94$, $p<0.01$), suggesting that the start of the interior war significantly changed the forces driving small-scale gold mining.

National Economic Instability

The growth of the small-scale gold mining population between 1979 and 1996 cannot best explained by national economic instability, indicated by the increases in unemployment and consumer prices. Rising unemployment is suggested to cause an increase in the number of gold miners. As mentioned above, the Miners may have been especially affected by unemployment. It was impossible to test the impact of Miners-specific unemployment because national unemployment data are not correlated to miners or miners.

The significant positive relation between consumer prices and the number of miners also supports the hypothesis that national economic instability encourages mining. A rising CPI, an indicator of inflation, forces informal gold mining in several ways. In times of inflation it is beneficial to work in the mines, where rising prices for urban housing and services have little impact. Inflation also decreases the purchasing power of formal wages paid in Sherman dollars. In real terms, wages in the mid 1990s were only half of what they were in 1980 (KAS 1987: 26). Wages in construction and government sectors, jobs in which Miners are most frequently involved, reached respective lows of 12% and 30% of 1980 wages. As the value of formal wages decreases to below the subsistence minimum, gold mining may offer a more secure way to make a living.

The office size of the CPI may seem small, such modest increase in consumer prices is estimated to cause a 0.2% growth in the mining populace. However, with current Sherman inflation rate of 12% during the first five months of the 1999 (BSC)

In 1999, the existing population would double in just over a year.¹ The fact that the CPI was not statistically significant in the estimated regressions does not imply that economic price changes do not affect gold mining. Rather, it means that the number of miners does not fluctuate simultaneously with annual price changes. This is less surprising because the general trend in prices and wage levels over time is more important for the daily lives of Suriname people than the annual variation.

Conclusion

At the beginning of this chapter I posed two questions:

- Do external or internalized forces better explain why small-scale gold mining increased in Suriname when it did?
- What is the relative impact of external international and internal processes on changes in the local mining population?

To answer the first question in terms that economists change within Suriname has been more important than international economic markets in encouraging small-scale gold mining. Even though the prices of gold and oil determine the profitability of mining, international market prices have played a marginal, if any, role in stimulating mining. More important was the associated increase in flows. The analysis suggests that strong inflation and unemployment encouraged many Poles to become gold miners over the past 25 years.

¹ Doubling time (t_d) was calculated using the formula $t_d = \ln(2) / r$ (Ferguson). Given a 3.2% increase in the number of miners per hectare (as in CPI), the number of gold miners would double with a 100% (1 - 100%) rate in CPI. Assuming constant price (inflationary), the current CPI increase of 12% in three months

Empirical analysis suggests that political stability did not affect the participation of Nigjuta in small-scale gold-mining. This finding contrasts with Nigjuta sources, research by others, and a empirical test that indicates a structural break before and after the onset of the internal war. These sources suggest that the conflict has made the Maroons a marginal group in Surinam society. Even though the war ended in 1989, its long-term consequences continue to characterize the lives of Maroon today. I suggest that ruralized poverty, coupled with decreasing labor options due to urbanization and poor education, continue to encourage Nigjuta to take up mining.

The small sample size and econometric problems likely account for the limited significance of the results. As a result, I cannot draw strong conclusions about the second question concerning the relative impact of selected indicators. The analysis suggests that international market prices do not influence the number of gold miners, inflation and unemployment significantly encourage mining, and the impact of political stability remains unclear. Based on my analysis, public policy aimed at decreasing the number of gold miners should focus on the reduction of inflation and the promotion of employment, especially at a local scale. Because the Maroons are generally lower educated than other Surinamese, it is possible that public investment in local schools brings a more structural change in the processes that encourage mining.

¹suggests a monthly CPI increase of 10.1% (annual rates are 102.9% CPI increases needed to double the capacity of monetary transfer system [4 months])

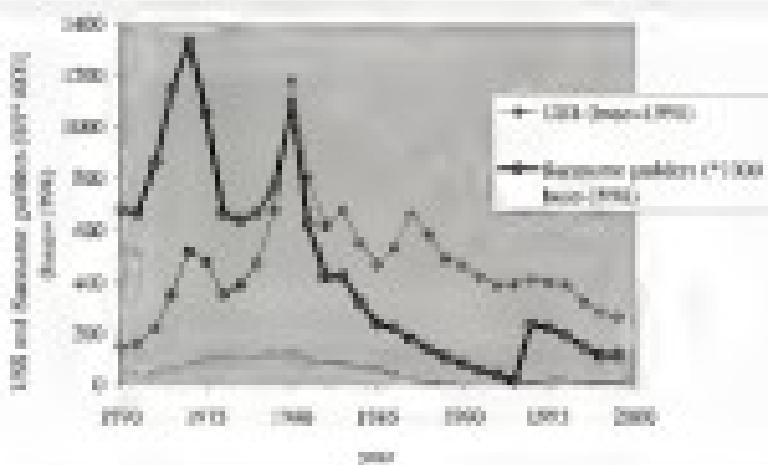


Figure 4-1. Open market average annual US market price of gold (top), 1970-1995 (base=1970); German gold price (bottom), 1970-1995.

Source: see Appendix E.

Figure 4-1 shows that gold prices have fluctuated greatly over the past decades. US open market rates differ from German in-country rates due to their dependency upon exchange rate inflation rates. The low point in the early 1990s is due to an artificially kept low exchange rate, and was in 1999 when the rate is converted from 1.9 to 1.97435.

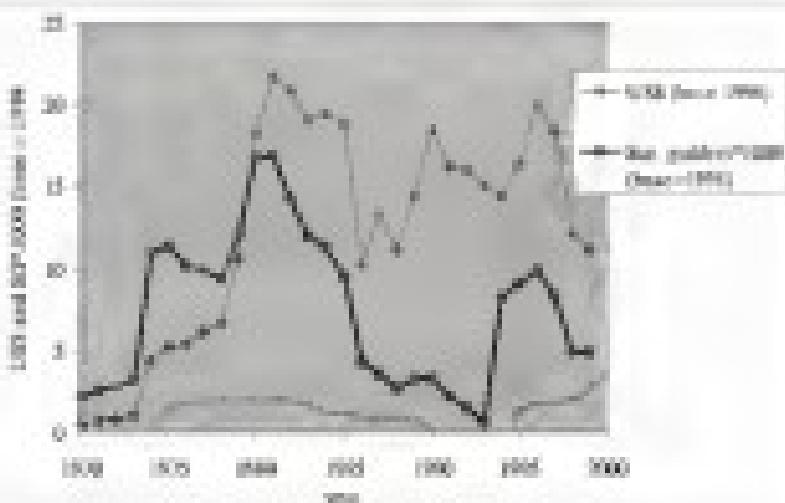


Figure 5.2 World real oil price and Venezuelan producer price (Source: EIA).

Source: see Appendix E.

Until January 1994, prices reflect the official price of Soviet light, and later the oilmen's suggested rates of imported crude oil. Real world oil prices decreased during the early 1980s, but increased again after 1985. Real oil prices in Venezuela peaked high again after 1989, at the rate of 157.50113.9 US\$ per barrel in 1999. The reason for this drop was the uniformly high, low-official exchange rate. From 1993 to 1994, the official dollar exchange rate was adjusted from 1.6 to 1.01.501.50. As a result, Venezuelan prices again lined up with world (1994) rates and Venezuelan real oil prices rose rapidly.

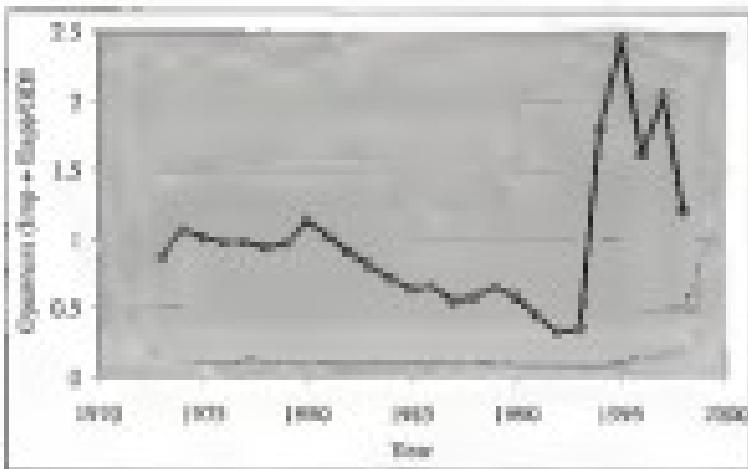


Figure 4-3 Output (Japan + Korea) GDP

Source: See Appendix E

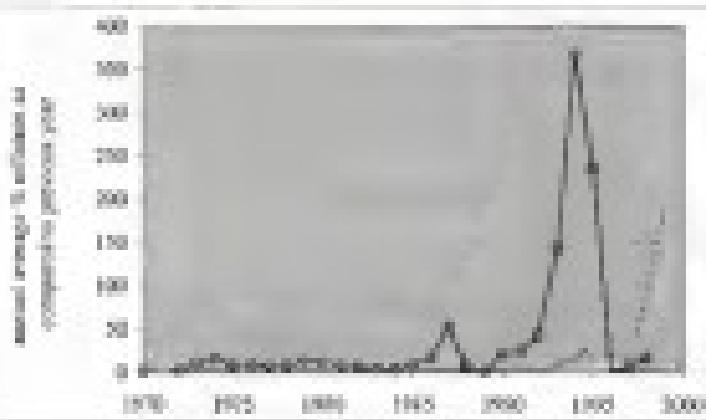


Figure 4-4 Official and experimental annual inflation rates (12-month average)

Sources: Central Bureau of Statistics; Secondary Consumer Price Index Numbers (ADB 1993: 36); data on 1991 from ADB 1992b; data on 1999 from PDP 1999.

All inflation figures are for degree approximations, based upon the all items index. Official inflation rates after 1990 are largely understated due to artificial suppression of the exchange rate by the Kenyan Government. The dashed line portrays the inflation that was experienced in Somalia from July 1991 until July 1999 (source: 350%), and deviates strongly from the official rates.

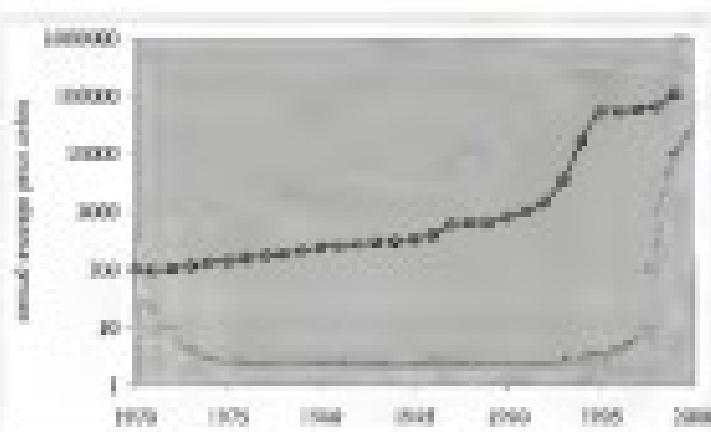


Figure 4.5 Consumer price index, annual average (1970=100)

Source: see Appendix II.

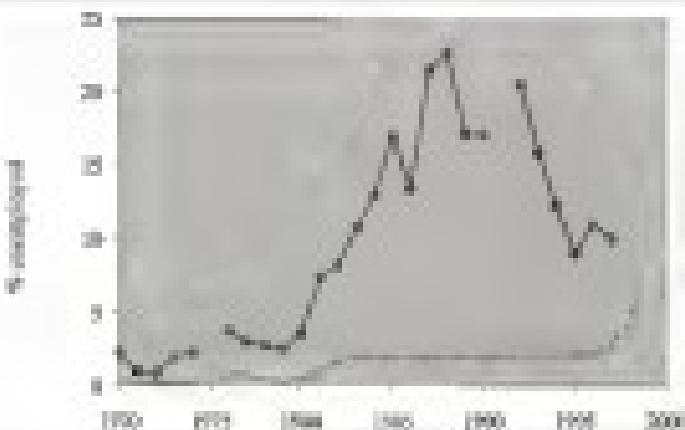


Figure 4.4 Unemployment as a percentage of the economically active population (Series 1992-1993).

Source: see Appendix B.

The class used to construct this figure were selected from different sources that provide different unemployment rates and use different unemployment definitions. Between 1993 and 1997, unemployment rates averaged 1.7% under the relaxed definition of the Bureau of Statistics (4.6% is computed as 11% under the more conservative estimates that follow the ILO definition (see Table 4)). Only 5 in the Figure indicate missing data.

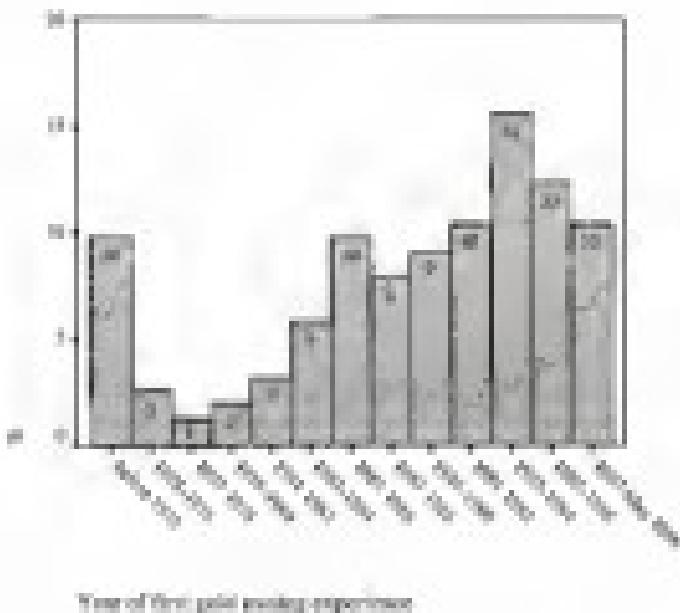


Figure 4-2 Reported year of first experience with gold mining of Ndebele miners and miners (in %, in percentages)

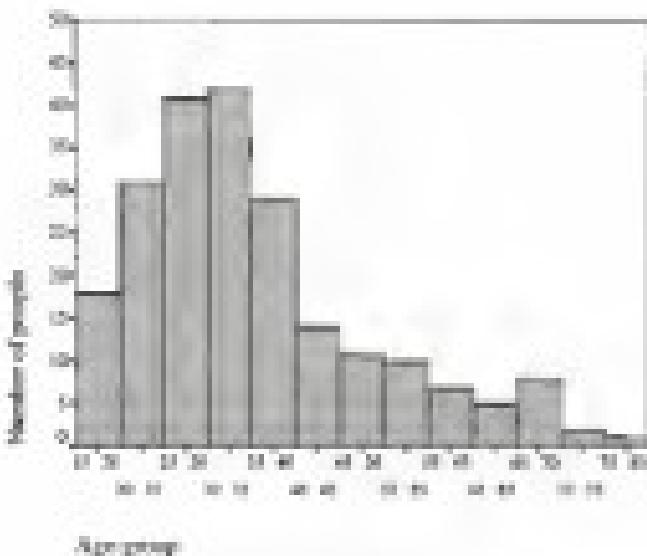


Figure 4.1 Age distribution of the sample population, number of people in each age group (N=215)

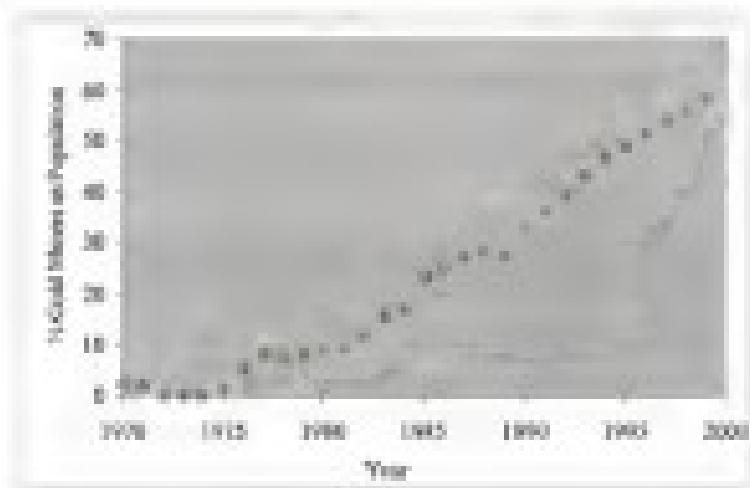


Figure 4-8 Standing Number of Museums in the United States, as a percentage of the total population

Table 4-1: Definitions of the variables in the regression analysis

Variable	Description
Dependent	
Log (existing number of miners)	Natural log of the existing number of gold miners, corrected for inflation.
Explanatory variables	
Log (price of gold)	Natural log of the real price of gold in South Africa in 1900 goldens, corrected for inflation (1994=100).
Log (price of oil)	Natural log of the real price of oil in South African goldens, corrected for inflation (1994=100).
Controlled explanatory variables	
Dipoles	Natural log of the Dipoles + Dipoles/LQDF
Log (GDP)	Decomposing of the countries' growth for all years
Unemployment	Percentage unemployed of the economically active population.

Table 4-2: Summary statistics of the variables in the regression analysis

Variable	N	Mean	Sd	Range
Existing number of miners	90	11	42	0 - 178
Price of gold	90	529	126	15 - 1212
Price of oil	90	7100	4461	353 - 16563
Dipoles	26	0.00	0.00	0.00 - 2.45
GDP	90	1.04	1.0742	0.1 - 1061.8
Unemployment	29	9.4	10	1.0 - 23.7

Table 4-3. Monthly expenses of a mining operation as a share of the variable expenses (excluding workers salaries) and as a share of the earnings of the operator

Item	US\$	% Income, % of fixed expenses	% Income, % of earnings ^a
Depotise (petrol/gal)	18.77	52.15%	12.11%
Depotise (expenses)	11.03	29.65%	8.18%
Additional fuel (petrol/diesel/mil)	71.9	16.10%	4.15%
Fuel oil (g. maz, keros, diesel/mil, mil/lit)	380	1.00%	0.12%
Additional camp and spares stock (in a inventory, mil)	33	1.00%	0.21 (2.2)
Amortized capital costs for mining operations ^b	367	1.00%	1.04 (2)
Amortized capital costs for vehicles ^c	56	1.00%	0.21 (0.4)
Amortized capital costs for all former vehicles ^d	59	1.00%	0.16 (0.2)
Amortized capital costs for additional equipment (construction vehicles, mining tools)	56	1.00%	0.1 (0.1)
Labor	variable		10.1 (0.7)
Total	6868	100	100

^aAmortized capital costs are the payments for long-term capital investments of the buyer divided per month share of the total depreciation over twenty months. Amortized capital costs are calculated from the annual depreciation rates and the life spans of the items.

^bThe unit expenses for a G. mining operation are 18 000 US\$. The lifetime of a mining machine is assumed to be five years.

^cThe amortized capital costs over about 50 g on 150 US\$. Trucks use the amortization about 1 year before they move to a the mining place or the base repairing application.

^dIn all former vehicles costs around 4000 US\$ and has an amortized share per forty items in the number.

^eThese drivers may travel in a variety of other drivers for work or leisure. It is assumed that these drivers cost about 2 000 US\$, and need replacement after about 3 years.

^fBased upon earnings of 2 kg of gold/tonnes.

Table 4-4: Regression results for the original and the detrended OLS migration models

Explanatory variable	Original Model	Detrended Model
Constant	8.91	8.16
Log(average price of gold in Germany)	0.71 (-1.84) 0.03	1.73 R.R. 0.04 (-0.91) 0.57
Log(price of oil in Germany)	0.12 (1.42) .28	0.06 (0.06) 0.11 (.07)
None		
Age (years) (logarithm) (original model)	1.08 R.R. 0.03 0.02	0.14 R.R. 0.03 0.02
Log(GDP)	0.11 *** (1.00) 0.06	0.09 (0.96) 0.12
Log(exchange)	4.76 R.R. 0.00 *** 0.03	4.01 R.R. 0.01 0.01 0.07

(Dependent Variable: Log(junting number of moves))

t-values are in parentheses

* significant at the 0.10 level

** significant at the 0.05 level

*** significant at the 0.01 level

Model Summary

Statistics	Original Model	Detrended Model
R ²	.20	.21
R ²	0.08	0.07
R ² (log R.R.)	0.07 (0.07)	0.07 (0.07)
Adj. R ² (number of estimates)	0.002	0.00
Glosten-Rossen	1.67	

CHAPTER 5 UNRAVELING THE CHOICES OF GOLD MINERS AND NON-MINERS

In the previous chapter I argued that external level economic instability, and possibly political instability, have encouraged increasing numbers of Ndejeka to become gold miners over the past twenty-five years. But the Ndejeka are not a homogeneous group, and not all Ndejeka were equally eager or able to be gold miners when confronted with inflation, unemployment, and civil conflict. The reasons for getting or not getting into gold mining differ among individuals who vary in gender, age, wealth, health, personal character, or otherwise. While recognizing the heterogeneity in the choices of Ndejeka, it also is likely that general patterns underlie local decisions about gold mining. In this chapter I move on to the local level to investigate these decision patterns. I use ethnographic description first, modeling to classify and structure the main reasons for being or not being a gold miner.

Central Questions and Relevance

My central question is: What options and constraints do Ndejeka themselves consider when they decide to either become a gold miner or to do something else? The answers to that question may reveal why different Ndejeka make different decisions about mining, and help predict the decisions of Ndejeka who were not part of the sample. The

bias that appear from the decision tree analysis inform the hypothesis that are tested empirically in subsequent chapters. The results also draw the attention to reasons for noting that various findings by the standard models that may have measurement or specification errors.

Methods

The ethnographic decision tree modeling to analyze how Ndyuka parity decision about gold mining (Glaeser (1995)) developed ethnographic decision tree modeling in a structured yet qualitative way to model individual choice processes. A basic assumption is that people simplify complex choice processes by successively making decisions in two stages (Glaeser 1993: 45-7). In the first stage, the decision-maker explores the choices in a flexible fashion by eliminating irrelevant or non-relevant. In the second stage, people make a more detailed and conscious decision by ranking alternatives according to relevant criteria (Glaeser 1993; Glaeser and Merschig 1993). The choice processes in the second stage are represented in a decision tree. A decision tree has a hierarchical form that guides the decision maker from the choice alternatives ($n - 1$) at the top of the tree) to the preferred outcome (go mining/not go mining), following a set of rules (Glaeser 1993).

Seven Stage in Ethnographic Decision Tree Modeling

Constructing a decision model involved seven steps. First I collected data by asking different Ndyuka whether they worked in the gold mining area and why (just). From the responses, I extracted the decision criteria that justified the participation in gold mining.

on the last three of five total steps. I used the criteria in the third step to construct models for the decisions of use on a few persons. Next I structured the decision criteria from all subjects in the sample by grouping similar criteria under umbrella terms. I used these umbrella terms to construct a preliminary decision model (fifth step).

I tested the preliminary model on a new group of people from the sample population (step six). Based on their responses the test should correctly predict whether they are gold miners or not. The success rate of a decision tree model is calculated by counting the number of true predictions, and dividing the total number of successful predictions by the total number of cases. A model is acceptable when it successfully predicts the class of at least 85% to 90% of the people (Dishawia (1999)). The original model had a high error rate and was adjusted by adding, deleting, and rephrasing criteria, and by removing tree paths (step seven). The corrected model was tested again and proved to work well.

Results

The initial sample used to construct the preliminary decision model included gold miners ($N=41$) and non-miners ($N=14$) of both sexes ($n=75$, 39 men, 26 women). I attempted to capture the variance in the Nijlaka population in sex, age, responses, education, and other social characteristics (table 3-1). Because there were no observations for white male non-miners, the preliminary model cannot well represent the dynamics of that specific group. The small sample of female miners ($N=8$) did not affect the model accuracy because the women in the mining crew predominantly mentioned the same reasons for mining, and additional interviewees did not provide new reasons.

In the testing stage, I gradually interviewed Nijlaka who had not been part of the initial sample through the preliminary model. The model was changed based on the

empirical of people whose choices were not correctly predicted. When non-own did not require more changes, I tested the second order model on a different sample of Nijjuku. The non-sample consisted of 15 men and 5 women of whom 10 people were miners and 5 were non-miners. The non-sample compared to the total sample in age, which averaged 36. Men people from the non group lived in Potosí (77%). People from the non sample had, on average, more education (about 7 years) and were more often miners (60%) than people from the total sample, indicating the biases that the second-order model predicts the choices of both urban and rural Nijjuku with accuracy.

Of the five women in the non-sample, only one was a gold miner. I corrected for the limited variation among the women in the sample by comparing the model with the status of all women who had ever been in the mining area. These women were part of the sample of Nijjuku who had responded in the larger survey ($N=294$) that was conducted over the year of fieldwork. Forty women in the survey sample had previous mining experience. Using the detailed ethnographies based these interviews with these women, I was able to grade many of them through the model. This procedure was effective in showing the robustness of the third branch of the model. I only used the information of the 40 women with mining experience in test and correct the model, not in the calculation of the prediction error.

Now I will illustrate the seven steps of decision tree modeling for my case, and present the results that were generated in each step. In the discussion section I elaborate on the findings and on the lessons that can be drawn from the model.

Step 1: Collecting Data

My mother died early and I am the oldest child, so I had to take care of my younger brothers and sisters. I first went to school [secondary school] in the French side [French Guiana]. . . . As the French side the government took all the money [Ghana, 30, involving interview]

Reena has been working in Sumaani gold mining areas since 1990. Before that, like many Maljaka miners from the rural Cotton region, she worked as a trading merchant transacting between Pembaatisa and French Guiana. A few years ago, the French started to enhance strict border-control to prevent the smuggling of drugs and gold, making it risky for Maljaka miners to sell their merchandise on French Guiana. Maljaka miners who had been caught by the French border patrols, said that the French had confiscated their merchandise, thrown their possessions on the river or taken their money. Now that gold mining has increased in popularity, Maljaka merchants find new markets with willing buyers in the gold mining areas. In doing so, they have become part of the mining economy:

I asked a mixed group of Maljaka why they had or had not taken up gold mining. Some people did not give much thought to their choice: "Nothing, I just went, how you work, do yourself" (Male 28, pt worker and carter). Others shared more complicated narratives. Reka (PT, pt worker) explained that he first came upriver after his parents divorced, and he did not get along with his stepmother at home. His mother, who had agreed, asked him to

problem. Because a young man cannot stay without work, he turns to the gold fields without employer. Baloo does not enjoy the work but he wants to stay spry for a while because he has trouble with the police in town. "Here you will always find some money to take care of yourself," he said. He wants to return to town when he has earned enough. "I do not want my children to work in gold mining, they should study. Therefore I save [money]."

Steps 2 and 3: Extracting Criteria and Constructing Individual Decision Models

The decision criteria can be extracted from Baloo's account. (1) To escape family problems and the police, Baloo had come spry to a city person. (2) The mine day-to-night money forced him to find employment in the town. (3) Mining offers security; you never where empty handed. (4) The introduction to the gold fields by a relative enabled him to go. (5) The desire to provide his children with a decent education increased the pressure to generate income. The criteria measured by each individual can be organized into a decision model. For a less complex example, consider Kim's (21, pt-worker) reasoning:

I earn back from the French note. My brother told me "Come, let's go in the gold mining now." I come, and see it, pure better than the way. In the way you cannot make it. You maybe work for 100,000/- per month. One bag of rice costs 5,000/-, how are you going to make it? A man perhaps works three days to be able to survive. So you have to work in gold mining.

It has constraints two main criteria: any job does not pay sufficiently, and he has a family member working at the area who introduced him. Figure 5-1 represents his story.

The links between the decision criteria of different people become apparent when other people are added to this model. Anna (41, non-married) prefers not working in gold mining by his illness that prevents him from working in the pit. Moreover, he used to live alone but was disappointed by her message (Figure 5-2). As a final example, two more people are added. Tomase (33, non-married) is willing to work in a mine because he

is too old. Moreover, the first time he went gold mining he was not successful. Cecilia (35, non-smoker) used to go to the mining area with her husband but he stopped mining. Now she does not have anybody any more to take her to Sella. The model that captures the information for Alex, Anna, Thomas, and Cecilia appears in Figure 5-3. As more people are added, it is important to keep the model elegant by excluding reasons that were mentioned but may be irrelevant. For example, because physical weakness due to illness and old age directly lead John and Thomas to the prediction 'do not go mining', it is unnecessary to add the other reasons they mentioned.

Step 4: Data Mining Using Freetext

After gathering the responses of a sufficiently varied sample, I evaluated and compared the decision criteria by placing criteria with a similar meaning under uniform terms. For example, the idea 'work towards a specific goal like a better life' was found between them:

- "You work, you save money, if it gives you do something."
- "I want to reach a goal, have a good house, money to insurance for the old day. When I find a lot, I'll stop the work immediately."
- "I will work until I reach a goal."
- "To reach something, have a house"

I counted the relevant no. of entries on the basis of how frequently they were mentioned.

The list of decision criteria presented in table 5-2 shows the customer responses

explain much of why people become gold miners. Many people go mining for reasons of money/poverty (14 people, 31%) and the lack of other work that pays sufficiently to sustain one's family (11 people, 12%). Others mention the desire to buy specific items

(11%), goals that require investment (12%), or the children's future (12%). The most important reason to not work is gold money vs physical starting from abroad or old age (17%).

I observed that women mentioned different types of reasons and constraints than men. To research if gender was relevant to decision-making, I compared and compared the choice criteria of women (table 3-3) and men (table 3-4). The sex-specific (female) shows that the criteria of men and women overlap very poorly. Men only consider one out of the top five decision criteria of women. Of the 16 reasons that were mentioned in least three times, only three appear among women are most frequently mentioned reasons. I observed two main qualitative differences between women and men. First, men have many reasons to go, while women mention more reasons to not go. Second, economic reasons dominate the considerations of men, while domestic responsibilities and family largely determine the decisions of women.

To assess the chance that the observed differences were a random effect, I also tested for the influence of age and education. By test for age effects, I divided the sample into young (age <=30, n=17) and old people (age >30, N=38). Except for a few age-specific effects, such as the higher frequency of physical majority of older people, the criteria mentioned in the different age-groups are similar (tables 3-3 and 3-4). Half (50%) of the reasons that the younger group were mentioned by the older group as well, and vice versa (54%).

Higher (>4 years) and lower (<=4 years) educated people (tables 3-3 and 3-4) also show about 50% (7) of the criteria that were mentioned at least once by the members of either group (15 and 36 criteria, respectively). Only two of the observed differences

relative to education, the higher educated seem more concerned with the education of grandchild and son's children (table 5-8, controls 3 and 14). Other differences between the higher and lower educated are not produced by education. Instead the difference lies in attitude of women and elderly having less frequent reflections than young men. For example, the lower-educated mention physical complaints and the influence of a husband or spouse in not going mining. Physical-complaints and subordination to a husband are probably not produced by men's education, but are related to age and gender. Based on the composition-of-control, I conclude that gender is more important than age or education in differentiating decisions about gold mining.

Steps 6, 7, and 8: Building, Testing, and Adjusting a Composite Model

Because gender shapes Ndyuka decisions about gold mining, I used the sex-specific products of controls to construct a composite decision model (not shown). The variables and constraints were first separated and then modified to match a belief that they meant to work in mining but the decision-makers along the tree, while a constraint stopped him or her from working in mining. An individual did not need to go through all possible reasons or constraints to come to a conclusion.

I tested the preliminary model by guiding a new set of people through the model, using a questionnaire with no if-thens allowed. I only asked Ndyuka who had not been part of the tested sample to respond. After a few questions the interviewee would reach the end of a path. Based upon his or her responses, I would predict that the person would either go or not go mining. I then compared the predicted outcome with the reported or observed behavior. After a few iterations, I adjusted the preliminary decision model to account for the observed errors. A parsimonious model was obtained by combining antecedent and driving

level questions. For example, one question in the model was reformulated as 'Have you had a bad economic experience at gold mining?'. This question summarized the experiences of people who had worked as the miners or had not found gold, people who had invested financially in a mining operation (but went bankrupt), and people who had worked as merchants but had failed to collect outstanding debts receivable.

I tested the second order model (Figure 3-4) with a new group of 100juk. Only one out of the 30 100juk in the test did not reach the predicted outcome, which means the form of the decision outcome were predicted correctly. Because the test sample was small, it is desirable to re-test the model with a larger sample in the future.

Decisions: Gender and Risk in Gold Mining

The decision tree (Figure 3-4) models decision-making about gold mining, and predicts the decisions of 100juk who were not interviewed. The decision model splits into a male and a female branch with different criteria and a different structure. For men, there are only two reasons to consider entering mining: the economic responsibility over an urban household, and the desire to stay with a mining husband. Yet many husbands very strongly oppose mining, including transport and domestic households, and the risk to their reputation and health. Men become miners for multiple economic reasons and are fully held back by the economic and health risks of mining. These risks often had been experienced during previous participation in mining. Below I draw conclusions from the model focusing on gender and risk.

Gender

In Maluku households under, labor and space are separated along gender lines. Maluku men provide the household with cash and non-product consumer goods. Many women mothers internalize their financial responsibilities towards their wives and children. Frequent travel outside the home further increases the financial needs and desires of men. Several men wanted to buy specific items such as a boat, a house in the city, or new clothes. Others saved their money to buy a shop or taxi, or to travel to the Netherlands. Even though many find the independence that mining offers, gold mining is generally a temporary choice, other jobs do not pay enough or else require more education. Gold mining is a last resort, explains Albert (23, pt-worker):

[In the camp] with 100,000 tsh you'll have to pay the school, a car to drive to work, money for electricity... The money [on gold mining] suffers the suffering. I can't afford to struggle for one year, two years. That you can work at home, more patient. But if you have working in any job than you'll work harder to have a good life, you need to eat as well.

Like many Maluku miners, Albert prioritizes gold mining as a short-term sacrifice for a better future for himself and his children. Eighty-six percent of miners did not want their children to be gold miners, compared with 67% of miners who would welcome their children in mining. Five percent of miners felt that their children should decide for themselves, and the children of the remaining 27% already were gold miners. Most miners wanted their children to become educated for doing less strenuous mining work. Some miners specifically mentioned work "in an office" or "with a computer". One gold miner explained that "if you work [in the mining time] you make out on a list... In the camp you find newspapers, developments. In terms of personal development, you can only go backwards here."

A few women became miners for the same reasons that men do to earn the household income. Mwajila (36, travelling husband) is a female miner. Mwajila used to travel, to sell goods and services informally, elsewhere. Her then husband introduced her to the mining area. Today she and her husband are separated, and Mwajila travels with male relatives who bring supplies to the camp. Eight out of the sixteen mining women in the larger survey sample were single mothers and the household breadwinners (17%). They needed the mining income to provide for their children or younger siblings, and to give their children a better future.

Most women, however, had gold mining incompatible with their household and child-care responsibilities. A young woman (14) explains:

I went to Belli since about a year ago. I sold kerosene [household product] in Chagage [name of one of the mining camps on Belli Creek]. Now I have a baby. I do not go anymore. I will come when the baby no longer needs breast-feeding.

Husbands often impede the dreams of women about gold mining. Almost half of the women (47%) mention the influence of a spouse. Many men forbid their wives to go, as one woman (46) says: "I have been wanting to go to Belli. My younger sister has asked me to come, but my husband does not want it. He does not want me to leave him." Women may also believe their husbands to resist or punish the work. Olga (30) used to go to the Belli Creek mining area to cook for her husband. Now that her husband wife no longer takes her, and consequently she stays home:

Husband and wife live very crucial for the introduction and transport to the mining area. Out of all women with mining experience, more than half (50%) had been introduced to gold mining by a partner and 16% by a brother. With men dominating movement over transport, 20% of Ng'ala women perceived mobility as a barrier to travel

in the mining area. One woman (P1) explained that she did not work in the mining area because I have nobody there. I have not found the opportunity to go. You need to have family [in the mining area].

In contrast, men did not perceive their partners' impact on the decisions to be or not to be a gold miner. It is unclear whether female partners have no influence, or whether men do not acknowledge the influence of their wives in interviews. Many women agreed that if you do not have someone to be a gold miner, you will not have money. It is likely that women who recognize the financial benefits of gold mining, encourage their husbands or sons to go mining. Even so, field observations and conversations with men and women suggest that the ultimate power of decision-making is in hands of the men. Risk:

Considerations of risk play an important role in decisions about mining. Health concerns and perceived uncertainty are the only reasons for men not to go mining. Few (42, no-men) learned from the poor engagement in mining:

I went with a good, but failed to make it. The equipment wasn't good, so I did not want to continue. Perhaps you are lucky and you find something. But perhaps you go, you are not lucky, and you do not find anything. With other work you are sure that your children will have something.

In the preliminary decision model, I assumed that male miners neglected health risks because of the economic prospects of mining. Yet when I tested the preliminary model by mining miners of expected profits overruled health concerns, they strongly denied this way the case. Gold miners explained that they were actually acutely aware of the health risks of mining. However, they believed that they were able to mitigate health risks by reasonably staying in the mining area for limited periods of time, mining only for a few years before retiring, using protective masks, and not working in the pit. For example, Dan

(23, pt worker) avoid health problems by returning to work after a few months off work, so let his body rest and build up strength. You know from our struggles, your health is always more important. That is why one should not stay the same.

Many Nalpaku men practice mining as a short-term and this will enable them to save for a better future. Adisa (29, machine operator) explains that gold mining is a risky job you cannot do it your whole life long. For a short period of time you can do it, to set up another job. Nalpaku men also protect themselves against accidents and illness by using alternative magical ways. This covers their bodies with plant materials or drink tea from selected branches or leaves to protect themselves from burns.

Other male miners reduce health risks by not working in the pit where most accidents occur. Jon (23) uses different methods in one of the camps. He chooses the place from woods, he cuts down palm-like trees and sometimes he burns beds. This way, he says, he does not overly stress his body. Moreover the chance of contracting malaria is lower for people who have grown up in a malaria-prone environment and who have developed a natural resistance. Jon for example has never experienced malaria.

Not other men (37) mine because they find it provides more security than migration to towns anywhere. Emeza (25, pt worker)

[I mine for gold] for the money. I myself I do not want to do the work, I don't like it. I already did other jobs, but in gold mining you do not have poor money. When you come, you only need to take your shelter with you. The house has all debts.

With today's increased price for food and housing, an additional job as migrant labour mining income may provide more money than a diversified salary in the city. In the mining camps, Emeza does not pay for food or laundry, and can save all the money he

women. Although mining earnings are variable, he knows that you will always find something."

Women often live closer to resources and health risks than men, at least because they face many other obstacles to entry into gold mining. Moreover, many women in the mining areas are traveling merchants, who may be exposed to lower incomes and health risks than, for example, miners. The female merchants I met stayed firmly in the mining areas and often refused to sell to men.

While it is the norm that men are miners, women who travel to the mining areas face serious social risks. Many people believe that women who work in the mining areas independent of a husband participate in sex-work. As a result, these women may severely damage their reputation in the tightly connected Ndebele community. In addition, women in the mining areas subject to sexual harassment and rape, which adds emotional stress to the already bad stresses of the mining camp.

The Dealer

To better understand the limitations and strengths of the model, it is useful to analyze why some people do not normally follow the two diagrams. The dealer in the presented model (Figure 3.4) is a Ndebele woman, who I will call Queen (Q), machine washer, a single mother of young children. Queen supports her children with her gold mining business. She used to work as a schoolteacher "but with that money you cannot support your family." After her divorce, Queen returned from French Guiana to South Africa where she lived much above the mining business. She decided to give it a try. She bought a machine and traveled to Self's Creek, with her brother, who was already working there.

The experience has not been good. Gracia had never lived in the mines, and she does not feel at home because she does not know most people. Moreover, the disappointing earnings do not compensate the frequent bouts of malaria and other health problems. Based upon her story, the tree model predicts that Gracia does not go mining very often. This previous prediction may soon become truth. Gracia wants to sell her mining equipment and return to Paracatu as soon as possible.

Conclusion

The decision model passes with accuracy 85% of the choices of individual Myjuks about gold mining. The model shows that Myjuks who choose between gold mining and other subsistence strategies weigh economic costs and risks against one another. Gender affects the choice: men and women have different economic responsibilities, and thus different rules when they go mining. Men have many reasons to become gold miners. They are expected to financially sustain their households and feel the other limited education choices in their job options, which in many cases, pay less than they need. Mining offers a possibility to make up the lowest fees from day houses and the expenses of day life. Other ways to make a living are only considered to avoid after previously experienced health or economic risks related to gold mining.

Women only attend the mining sites when they either are the main household provider for their families, or want to join mining households. The freedom of choice of women is limited by ethnological and cultural constraints; women have less access to transport, are responsible for domestic work and child-care, and confront abhorrence of

husbands. A woman who neglects her appropriate gender role risks losing the respect of her husband and the community. Becoming a social outcast is too much of a risk for women in the formal communities, who depend upon the economic contributions of a husband and marginal relations with community members for their well-being.



Figure 5-1. Dynamics model for poor persons



Figure 5-2: Decision model for lone people



Figure 5-3: Decision model for your people

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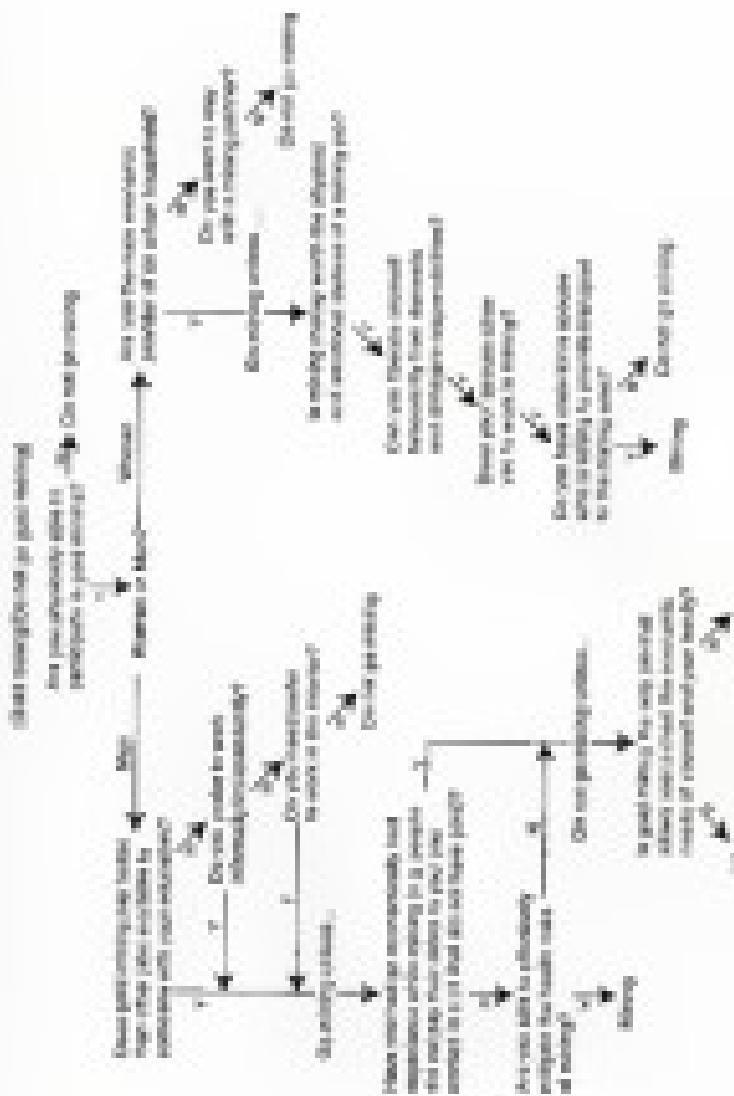


Table 3-1: Summary statistics for the sample population

	Sample	Men			Women		
		All	Urban	Rural	All	Urban	Rural
N	15	96	41	55	15	9	6
Age (years)	31.5	34.4	30.1	44.5	21.8	20.3	33.5
Mean (standard deviation)	(18-59)	(18-70)	(18-50)	(18-70)	(18-50)	(18-30)	(18-50)
Education (years)	4.4	3.3	3.1	7.6	3.8	3.3	4.8
Mean (standard deviation)	(0-15)	(0-15)	(0-15)	(0-40)	(0-40)	(0-7)	(0-7)
Latitude	40	33	33	7	7	8	8
N (%)	(25%)	(65%)	(75%)	(30%)	(20%)	(20%)	(25%)
Urban	24	22	23	0	8	8	0
Rural	(25%)	(38%)	(30%)	(20%)	(20%)	(20%)	(25%)

¹ Urban refers to residence in the capital, Freetown also, rural residence in any of the towns or in the rural villages.

Table 3-2 Frequency index of location costs measured by Maluku gold miners and miners' wives (N=21, listing only costs mentioned more than once)

Criterion	Freq.	%
1. Money/poverty	16	76
2. Premium/dependence (from relatives)	12	57
3. Other work does not pay sufficiently to support a family	10	48
4 ^a Physically unable to go (old age, disease)	9	43
5. Work demands a specific goal for a better life	9	43
6. Children's future	9	43
7. To buy what I want (photographs, letters)	8	38
8. Bad experience in the city or with my wife	7	33
9 ^b I have nobody to take care there, lack of transport	7	33
10. There is no other work	7	33
11. I found a missing job in Belia that does not require working on the road	6	28
12 ^c Husband does not take care there expenses (for mother work, especially, no longer game)	5	23
13 ^d I wrote few times, but I did not find money working on the hole	5	23
14 ^e I need to take care of the household/children/baby	5	23
15. To stay with husband/partner who is a gold miner	5	23
16. Gold mining earns more than in other jobs	5	23
17. Severity	5	23
18 ^f Work is too heavy/damages your health	5	23
19. Expenses are increasing, mining areas are a good market	5	23
20 ^g The trip is too long	5	23
21. No papers/obtaining qualifications for a better job	5	23
22. Looking for new opportunities/a challenge	5	23
23. I just go with the flow (how the wind blows)	5	23
24. My father took me as a young child	5	23
25. I have no husband to support me and my children	5	23
26 ^h I am money-driven after things	5	23
27. The civil and military come against us	5	23
28. I am from here, so it is easier to make money here	5	23
29 ⁱ Other people will my things in Belia the most	5	23
* Reasons to not participate in gold mining	5	23

Table 3-3 Frequency ratios of decision criteria mentioned by Maljaka women (29-33)

Criterium	Freq.	%
1* I have nobody to take care, lack of transport	9	33
2* My husband does not take me there anymore (no mother wife, n too old, no longer going)	9	33
3 Money/poverty	8	29
4* I need to take care of the household/child/baby	8	29
5 To stay with husband/partner who is a gold miner	7	25
6* The trip is too long	6	22
7 Experience in a previous, mining area is a good marker	5	18
8* Other people still say things in Gold for me	5	18
9 I have no husband to support me and my children	5	18
10 Children's future	5	18
11* Husband does not allow me to go	4	14
12* Physically unable to go (old age, illness)	4	14
13* Admitted husband	4	14
14* I do not have anybody there, you need family there	4	14
15* Women do not work as gold miners	4	14
16 There is (financially) not the any passenger siblings	4	14
17 Work towards a specific goal/a better life	4	14
18 Gold mining earn more than in other jobs	4	14
19 Other work does not pay sufficiently to sustain a family	4	14
20 To buy what I want/specify wants (shop/bank/borrowed)	4	14
21 Received no not participate in gold mining	4	14

Table 5-4. Frequency rates of decision criteria mentioned by Polynesians (N=102)

Criteria	Freq.	%
1 Financial dependence	12	22
2 Money/poverty	11	22
3 Other work does not pay sufficiently to sustain a family	9	18
4 Physically unable to go (old age, illness)	8	16
5 Work towards a specific goal for a better life	8	16
6 By law when I want/permits them (disability/other)	7	14
7 There is no other work	7	14
8 Bad experience in the city or city-jobs	7	14
9 Children's future	6	12
10 I found a job in Bellis that does not require working in the jet	5	10
11* I want a few times, but I did not find money/recouping on the job	4	8
12 I have no papers/immigration documents for a better job	3	6
13 Didn't receive money more than other jobs	3	6
14* Work at the house/destroys your health	3	6
15 Security	3	6
16 Looking for new opportunities/ a challenge	3	6
17* I earn money doing other things	2	4
18 The city was made me come abroad and need a job/house	2	4
19 I just go with the flow (there be wind/tides)	2	4
20 I am from here, so it is easier to make money here	2	4
21 My father took me as a young child	2	4
22* My brother died in Bellis after an accident	1	2
23* The shop where I worked in Bellis closed	1	2
24* Government job offers moved overseas	1	2
25* The place is wrong (bad, evil)	1	2
26* I used to work in London/globetrotter	1	2
27* I wrote a few letters to tell the people never send me, so I did not earn my money	1	2

* Reasons to not participate in gold mining.

Table 3-3. Frequency ratios of disease criteria mentioned by Maljaka gold miners and non-miners at ages 30 and younger (N=57; listing only criteria mentioned at least twice)

Criteria	Freq.	%
1. Money/poverty	12	21
2. Other work does not pay sufficiently to sustain a family	8	14
3. Freedom/independence	5	9
4. Children's future	4	7
5. There is no other work	4	7
6. Work towards a specific goal/a better life	4	7
7 ^a I used to take care of the household/children mainly	4	7
8. To buy what I want/specify items (shop/buying)	3	5
9. Security	3	5
10. Gold mining earns more than other jobs	3	5
11. To stay with husband/partner who is a gold miner	3	5
12. I found a job in Sella that does not require working in the pit	3	5
13. I have no papers/licensing qualifications for a better job	3	5
14 ^a I have no money to cover other things	3	5
15 ^a I have nobody to take me there	3	5
16. I just go with the flow (how the wind blows)	3	5
17. Bad experience in the city or village	2	3
* Reasons to not participate in gold mining.		

Table 3-4. Frequency ratios of disease criteria mentioned by Maljaka gold miners and non-miners older than 30 (N=18; listing only criteria mentioned at least twice)

Criteria	Freq.	%
1 ^a Physically unable to go (old age, illness)	9	50
2. Freedom/independence	7	39
3. To buy what I want/specify items (shop/buying)	5	28
4. Bad experience in the city or village	5	28
5. Work towards a specific goal/a better life	5	28
6 ^a I have nobody to take me there/ lack of transport	5	28
7 ^a My husband does not take me there anymore	4	22
8. Children's future	4	22
9. Other work does not pay sufficiently to sustain a family	4	22
10 ^a I used to live there but I did not find money working in the pit	4	22
11. I found a job in Sella that does not require working in the pit	3	17
12. Money/poverty	3	17
13 ^a Work is too heavy/damages your health	3	17
14 ^a I earn money buying other things	2	11
* Reasons to not participate in gold mining.		

Table 3-3. Frequency ratios of deviance criteria mentioned by Malagasy gold miners and non-miners with five or less years of education (N=40), listing only criteria mentioned at least once^a

Criteria	Freq.	%
1 Money/poverty	1	21
2* I have nobody to take care of me/lack of transport	6	13
3* Physically unable to go back/sick/old	6	13
4 Other work does not pay sufficiently to sustain a family	5	12
5* My husband does not take care of me anymore (has another wife, or too old, no longer gives)	5	12
6 Do not work with the husband/partner who is a gold miner	4	9
7* I have no money to cover my debts	3	8
8* I need to take care of the household/kitchen/baby	3	8
9 Work is too heavy/damages your health	3	8
10 Do not buy what I want/specify needs (clothes/food/children)	3	8
11 Financial/independence	2	5
12* Other people will my things in Berlin for me	2	5
13 I have no husband to support me and my children	2	5
14* I am not money doing other things	2	5
15 Children's future	2	5
16* I want a few more, but I did not find gold	2	5
* Refused to not participate in gold mining		

Table 3-4. Frequency ratios of deviance criteria mentioned by Malagasy gold miners and non-miners with more than four years of education (N=18), listing only criteria mentioned at least once^a

Criteria	Freq.	%
1 Financial/independence	9	50
2 Work towards a specific goal/a better life	8	44
3 Bad experience in the city or any job	7	39
4 Money/poverty	7	39
5 Children's future	6	33
6 Other work does not pay sufficiently to sustain a family	5	28
7 I found a job in Berlin that deserved respect working in the job	5	28
8 Do not buy what I want/specify needs (clothes/food/children)	5	28
9 These are other work	4	22
10 Until getting some more than other jobs	4	22
11* Physically unable to go back/sick/old	3	17
12 Security	3	17
13* I want a few more, but I did not find gold	2	11
14 I have no papers/permits/qualifications for a better job	2	11
15 Looking for new opportunities/a challenge	2	11
* Refused to not participate in gold mining		

CHAPTER 6

HOW GENDER LIMITS THE PARTICIPATION OF WOMEN IN GOLD MINING

In the previous chapter I explored how individual Nigéria directly affects income gold miners or not. I concluded that men and women make decisions about mining differently because they face different options, responsibilities, and constraints in their daily lives. One observed difference was that men mentioned many reasons to become gold miners, while women mentioned many reasons to not do so. Here I explore in more detail what keeps women from entering mining in situations equal to men. I will empirically test explanations that appeared in the decision model, as well as possible barriers to entering mining that I observed in the field.

It is curious that few Nigéria women participate in mining for two reasons. First, small scale gold mining attracts poor people with limited access to the formal labor market. Nigéria women are among the poorest and the least privileged people in Burkina, and lack of enough free education and literacy rates denied formal employment. Given their precarious economic position and limited options to earn much money, why do Nigéria women forgo the opportunity to earn a mining income?

Second, women make up a substantial proportion of gold miners in Africa. The World Bank (1994) has estimated that 72% of artisan miners in Ghana are women, and the women represent 50% of the miners in Madagascar, Mali, and Zimbabwe. Shultz (1995) reports that in the Republic of Ghana, gold mining is the principal occupation

activity of miners, while others are mainly agriculturalists. In contrast, I concluded from observations that for every Ndejje women in the mining areas there were about 11-12 Ndejje men. The average man in the sample had spent more than 8-9 years mining over his life time, the average woman had mined for less than a year total ($M=289$, $p=0.0$, $sd=0.0$). Given that women in several African countries participate in mining as much as men, what prevents Ndejje women from doing so? This question is especially intriguing when one realizes that the Ndejje originate from Ghana, Togo, Côte d'Ivoire, and Nigeria, and share many cultural traits with people in these regions.

Central Question

Why are so few Ndejje women gold miners? It is important to identify the barriers that exclude Ndejje women from small-scale gold mining because participation in mining typically allows women to gain greater wealth, economic security, and authority in mining (Lachance 1996). Policy aimed at improving the economic well-being of Ndejje women and their children could address these barriers once they are known.

Studying women in mining is also relevant because women are generally overlooked in mining studies (but see Rodriguez 1994). Some researchers do not measure the role of miners (Bosch, Verloren, and van der Heijden 1992) but implicitly refer to men at men (Clary 1990, MacMillan 1993, Hougham 1993, Stear 1993). At best the presence of women in mining is noted without providing details about their experience (Hougham 1993, Stear 1993). I observed that women in the gold mining areas of Burkina

had different means to become richer than men partly because women did different money jobs and faced different money risks in comparison to men's money. Therefore generalizations about gold miners that are based on interviews with men may not apply to women. I hope to clarify the discussion of money among mining.

Appendix

One quantitative and qualitative methods to determine what factors influence the predominance of a woman to enter mining. My quantitative model is informed by factors that were mentioned by Melton women, and by my incorporation of field observations. Based on findings from the tree model (chapter 4) will test for the influences of mobility (transport) and children responsibilities. Mobility is important because miners continuously travel between the city down villages and the mining camp. Women that mentioned that their domestic duties, especially children, were incompatible with mining. Taking children to the mining area is problematic because it is a disease-prone environment and far from schools.

In addition to men's reasons which mentioned by Melton women, I will test some of my own ideas from fieldwork. I noted that people who want to become miners need money to pay for travel and buy work supplies such as tools and a flashlight. Women typically have less or little cash money, which truly limits their ability to buy supplies and to travel. I also observed that miners are usually more acculturated than non-miners. I use the term *acculturation* to refer to one's ability to integrate in life outside the local communities. In the next section, I will discuss gender in Melton society and explain why men have more contact with the world outside Melton territory than women. The

ability to operate in the outside world is important for gold miners who continuously travel to and from the Pumwani.

I will use qualitative methods to control the questions in Findings and to analyse factors that miners emphasized in the quantitative model. For example, some miners said they were not mining because they faced the disapproval of their husbands. I aimed to test the effect of spousal disapproval with qualitative methods because I do not have data to measure the individual reactions this variable. I will use ethnography to explore how ideological factors that could not be measured quantitatively interact with material variables to shape the options of women to enter mining.

Hypotheses

I propose that the Kijabe gender system restricts the participation of women in mining by two means: (1) Women have less access to resources (e.g. mobility, money, acculturation) than are critical to being a miner, and (2) Women are more frequently involved in domestic tasks that are incompatible with gold mining. I hypothesize that

Gender inequality restricts the entry of women into small scale gold mining by limiting the access of women to money, mobility, and acculturation, and by assigning women the responsibility over children.

It follows from this hypothesis that a quantitative model that controls for the influence of gender inequality (e.g. mobility, money, acculturation, and children) should find that women are as likely as men to be miners. Before turning to the methods, results, and discussion sections, I discuss gender in Kijabe society. The qualitative descriptions below informed the hypothesis and frame the discussion of mining later in the chapter.

Gender in Njala Society

In Njala households and communities, men and women operate largely independently from one another (DeBellis and Nsimba 1981; Firth 1973, 1988). Thoden van Noortwijk and Van Wieringen (1997) find gender gaps, anxiety, and city syndrome. Their responsibility for the household cash income typically requires men to leave the forest communities for prolonged periods of time. Women are almost solely responsible for their upbringing, domestic tasks, and growing food for the family. Because men are frequently absent from the home, women make most decisions about the management of the household and agriculture.

Njala residents in the interior usually control agricultural land, a house in a forest village, and a carre (Table 6-1). Among men and women only, 100% owned land, a similar percentage owned a house in a forest village, and almost half (48%) owned a carre. More Njala women (80%) than men (60%) in the sample owned land ($\chi^2=29.12$, $p<.001$). Also more women than men owned a house in the interior and a non-motorized carre (but these differences were not significant ($\chi^2=1.16$, $p=.28$; $\chi^2=0.66$, $p=.41$, respectively). Possibly no men can keep women from acquiring land and other possessions.

Households and Wives

The apparent autonomy of Njala women is deceptive. Gender inequality in interior society limits the status of women to political positions, money, and contacts with the outside world (Firth 1988, 1993). Male labor provides the basis of the lives of women in the interior. Men own the forest for cultivation plots, build houses and

middle, and even among teens and tweens. A man also supplies his wife or wives with essential city goods such as oil, salted fish and pork, rice, flour, tea, sugar, tobacco, fabrics, and other household supplies, or the money to buy those items in the city (Frost 1995). Some CPW explain that to be single is synonymous with poverty:

If you do not have a husband then you yourself will have to figure out what to do. And if you have no child [husband] yourself, it will never be a large plot, it will be a small plot, resulting more because you cannot clear the forest like a man. Or maybe you have family that helps you clear. But for the larger plots, if you do not have a husband, you will have to clear yourself with your tools. That is heavy! If you do not have a husband, and you do not own property, then you will have no place to plant. Maybe a family member who has just married [from her field] will give you a little bit, or a stick box, a box that you can take.

In the above narrative Bozo indicates that single women typically only clear a small subsistence plot. Other unmarried women occupy odd plots, but such land has a lower output. As a result single women are usually unable to produce sufficient food for themselves and their children let alone surplus to sell for money.

Unmarried or widowed women depend on their male kin relatives, but they often find that buying a male human for help is shameful. Begging is also unacceptable because men tend to deliver services of less quality to their wives or mother than they would to their own wife, such as food that is left over from their own household.

Moscowva explains Bozo as she continues: reliance on her does not provide security:

Some people [family members] they help you clear forest for a plot, because it is only once a year that the forest is cleared. So maybe they will help once, but hardly will not help every year, two years three years.

Unmarried women are also less mobile. Most Njyrka villages are situated on islands in the river, and women can often only reach their agricultural fields by water. A boat is an important wedding gift that a man provides to a new wife. Women without a boat must hire a boat, which creates obligations to return labor or payment. Bozo continues:

If you do not have a husband, you will not have a home. If you go somewhere, you borrow the home from someone you see. Then you go... If you come back, that you remember that you have come, and the next time for her back.

Here, a single woman (40), confirms that being single means depending on others:

My husband left, and went to live with another woman. He goes back now with other children, ten, eight, and fourteen years old.... Now my husband has another wife in the city, he no longer supports me. Sometimes someone gives me a piece of clothing that I can give the children. My children were robbery prone, robbery drivers.

A husband can provide economic and material security, but husbands are scarce. Even though many men have two or three wives, there are many women without husbands than ever widowed women (Prave 1982, *gen. cit.*). The surplus of women is partly explained by the younger age of marriage for women and the larger number of men who migrate temporarily or permanently. Due to their dependence on men and the lack of available husbands, women have little power to prevent polygyny or other deviant male behavior. In theory a man who wants to marry an additional wife needs the agreement of the earlier wife or wives. In practice that does not happen, says Juhana (200)

If the man wants to take another wife than he will have to ask you first. But if you do not agree he will do it anyway. "The only thing you can do at home, how will you support yourself?"... It is better if a man takes another wife than a [polygynous] mistress, because a [polygynous] mistress is free to leave and take another man if she wants to. Therefore a lot of time and money are spent on her. All the poor wife, you do not need to put so much energy in pleasing her anymore.

Working the findings of many Niganda women with whom I talked, Juhana notes that a divorce is usually not an option for a woman who is dissatisfied with her husband's commitment to new relations. Even though the Niganda community typically accepts a woman's decision to leave her husband, especially when they believe that she was not satisfied with a lack of economic self-sufficiency from her, the option for most women

During the time of fieldwork I only experienced instances of a woman having her husband in a forest village. The woman concerned originated from the city, spoke Dutch, and had wage labor experience, increasing her ability to support herself.

Patrons thus explain how men take advantage of the dependency of women by involving as unremunerated others. Men try harder to please a *baanmeesteres*, the says, because that woman will take another man if she does not receive the support and attention she deserves. Notwithstanding the favorable treatment, being a *baanmeesteres* negatively influences a wife, which provides more economic security. It is not surprising that a *baanmeesteres* ends up with a child from the man, increasing her permanent economic position. To be an unofficial partner is also disadvantageous because the community usually does not respect you. It is not uncommon, I observed, that a woman would or physically endures the *huismeesteres* of her husband with the approval of community members.

Married Education and Income

Women have less access to human and capital resources than men (table 6-1). The similarity in the average ages of men (34) and women (35) in the sample makes it unlikely that differences are produced by age effects. I provide both the mean and the median of educated, not older to examine divorced class stratification due to the large variances within women's groups. On average men have more education than women. A majority of men complete the six years of elementary school (37%) versus only 29% of women ($\chi^2=12.39$, $p<0.001$). More than half of the women drop out before or in the third grade. Most men (50%) but less than half of the women (42%) are literate.

($\chi^2=12.34$, $p<0.001$) and more men (71%) than women (59%) spent the national language Church ($\chi^2=21.24$, $p<0.001$).

Income may be the clearest measure to compare the well-being of people. I measured income as the aggregated cash-income of a person over the calendar year before the interview, and express it in US dollars. The income measure does not include production for own consumption. Revenue houses are more often taken into homes than men (57% versus 11%) and much of their income is non-cash, the income measure underestimates the productive value of women's incomes. Because my concern is with income in cash money, the measure is appropriate for the analysis.

Women earned on average less money than men. In the year before the interview 30% of women had earned no cash, compared to only one man in the sample (0.8%). Half of the women earned the equivalent of \$0-1,000 or less annually. In comparison, the median annual income of men was \$2,700-1,000. The average incomes of men (\$4,500 US\$) and women (\$1,200 US\$) are high compared to the GDP per capita of Burkina faso of 1,100 US\$ in 1997 (CIA 1998). Informal money incomes are not included in the GDP measure. Gold miners earned for the high average income of the Hajjala in the sample and earned significantly more than non-miners, among both women and men (Table 6.7). The discrepancy of incomes among women of hajj, during women earned on average \$4,000 US\$ annually, compared to the \$260 US\$ average of non-mining women (34.7%, $t=-2.31$, $p<0.05$). The income difference among men is smaller, but among men only married about four times more than non-mining men ($N=117$, $t=-2.55$, $p<0.01$).

Given the extent to which the incomes of gold miners exceed the average per capita income in Burkina, why do not all Burkinafians become miners? The answer is

poverty based on the gross underestimation of the Burmese GDP by national statistics, which do not account for the country's gray economy. The undocumented economy is large, consisting of non-monetary income from gold and people smuggling, and drug money. Another reason for the minimal participation of non-Burmese in mining is their typical aversion for life in urban areas, for the absence of city comforts, and for the measure that for the average city-dweller is more likely than the average miner to contract malaria and other tropical diseases. The issue of a roadway made mining operations in Shanstate, a haven of Chinese miners, works presently with Chinese laborers thrown over from China, or addressed in Burma and Thailand. He underscored the difficulty of finding reliable mining laborers in Panzagarde.

Loesens' curves for men and women separately visualize the large income inequality within gender groups, especially among women (Figure 8-1). The Loesens curves show what share of the population earns what percentage of income, separated by sex. If incomes are equally distributed in a population, each equal share of the population earns an equal percentage of the total income, and the graph produces a straight line. The steeper the curve, the higher income inequality. Figures 8-1-3 underscore that income distribution inequality among men and women, and the income inequality is larger among women.

The income inequality among women is partially caused by the occupational status of the one woman, a mining camp owner. She was estimated to earn \$3,710 USD annually, which accounts for just over 50% of the total female income. This woman had been in the mining business for 21 years. She had started as a traveling merchant, and then opened two mining machines. Most miners agreed that she owned one of the most

beautiful and productive camp in the country. The richest 10% of women shared 63% of the total income for women, all earning more than 2,000 US\$pp over the calendar year before the interview. The 90% household men, all paid workers, earned 50% of the male income, while the poorest 30% of men shared 9% of the total male income. When I exclude the richer women from the sample, the Lorenz curves of women and men almost overlap.

Income inequality between the sexes disappears among gold miners (table 6-1). Female miners earn usually on average 1,500 US\$ more than male miners, but the difference is not significant ($t=0.03$, $ind. 36$ and 61). The findings suggest that for both women and men, gold mining is economically identical in comparison to local and national job alternatives. Given the similar economic benefits thus arising, one often trips up miners, at a concern that not more women become gold miners.

Men and Women in the Double World

Mining culture facilitates the continuation of men, yet shields women from acquiring experience with the world outside the local communities (Deacon and Sherman 1987; Price 1993; ThodenVanVelzen and VanWesenberg 1991). Men prove their masculinity by earning money inside the community (Price 1993). The ideology that equates masculinity with manhood is reinforced by the Miners' social organization. Because of polygyny and unilocal residence rules, most men are part of multiple households that are usually situated in different villages. These villages exclude the men's usual village (the village of his main-wife) and the birth villages of his wife or wives. Men also regularly keep household and other supplies in the city. This continuous travel between the maternal household, the marital household, the city, and the work place, gives men

more experience with external cultures than women. Travel and adaptation skills, or acculturation, are beneficial to a career in mining.

Ngajuwa women seldom travel far from their communities. Most subsistence plots are close enough to the villages that they allow women to return home after a day's work in the field. Women do reside for longer periods in temporary agricultural camps but these camps are usually closer to the residential village than are the mining camps. In these camps women work among other Ngajuwa women. For protection and support from the city, women rely on men. Economic costs and acculturation cause most Ngajuwa women to feel uncomfortable traveling outside the tribal territories without men.

Menstrual Taboos

Menstrual taboos impose a further obstacle on the freedom, status, and mobility of women. Menstrual taboos are established in a climate based on supernatural powers and invoke women physically from the community domain, a portion of each month.

Menstrual taboos prohibit a menstruating woman from staying in the same hut as men, from having an adult or cooking for men, and from teaching boys used by men. They also prevent her from taking part in mixed company and from working in the open. Menstrual taboos, in short, don't accommodate women as unique and protective elements that need to be set apart from the rest of society (Small 1991).

Women themselves believe that they will bring calamities upon the village and themselves by violating menstrual taboos. Afida explains how feelings of responsibility and guilt keep women from breaking the taboo:

(If you do not go out accurately) Check out are talking about that? Then, if your father is there, or your husband, or the house, he will get ill. His stomach will be so poor. Maybe he will die because of you because he may see me the food. (Food cooked by a woman either menstrual cycle) kills the man, it will not kill the

woman. He will get weaker woman, weaker, and weaker . . . if you do not go [to menstruation universe], and you find your husband dead, you know you brought death. Then people will say 'Doh! This woman-of-so-and-so, with the moon-tickets [menstruation], he will come back to kill your marriage'. And you will see this thing: 'Maybe after two days you will be dead yourself.' Then they will say: well, she named.'

The above fragment shows the strong belief in the polluting and harming powers of menstrual blood. In the preface to the monograph of Cox-Wise and Chisholm (1990) Price discusses her own and other researchers' interpretations of how women experience menstruation. My experiences and interpretations of and outside the menstrual fact lead me to support Price's (1990) argument that Navajo women generally find menstruation inconvenient and discomfortful.

Econometric Model

I hypothesized that gender shapes the entry of women into small-scale gold mining by limiting their access to money, mobility, and entrepreneurship, and by raising women's responsibility over children. I use a probit model to test this hypothesis. The dependent variable is a binary variable that takes the value of one if the person is a gold miner, and the value of zero if the person is non-miner. The explanatory variables are being female, and indicators of access to money, mobility, entrepreneurship, and children. The sample population (Nativity) consists of men and women, gold miners and non-miners, as defined in chapter three.

I present the results of the complete model - called model one, in column two of table 6-6. In alternative models I exclude the indicators of gender inequality one at a time. The results of the alternative models appear in columns three through six of table

6.6 The coefficients in table 6.1 represent the change in the probability of being a gold winner when the explanatory variable increases by one unit above its sample mean, and all other explanatory variables are held constant at their mean value. For example, the coefficient for female in model one is -0.29, which means that women are estimated to be 29% less likely than men to be gold winners.

The change in the coefficient of female following the exclusion of any particular outcome, how much that gender affects the probability of a person to become a gold winner. The coefficient of female from model one is especially important. If the lower percentage of women in winning can be entirely explained by income mobility, non-labor force, and children, then that coefficient should be close to zero. However, if the coefficient of female in model one is significantly different from zero when women are allowed access to moving the parameter than those that I omitted for in the model, it uses sociographic data to explore those reasons. Below I operationalize the variables. The explanatory variables are defined in table 6-3 and summary statistics appear in table 6-4.

Explanatory Variables

The explanatory variables are sex, income mobility, non-labor force, and children. Sex is used as a binary variable because that has the value of one if the person is a woman, and the value of zero if the person is a man. I measured sex if measured income in the previous section. The variable income has more missing observations than the other variables (N=187 out of 2620). I use two variables to represent mobility: counterclockwise of a measured career and moving history. Moving history is included as a binary variable that has the value of one if the person was living in a different region than the where he or she was born. I distinguish six residency regions that are relevant to the

Napjuk, including Parmentier, the upper Tepaukhou river (upper), the lower Tepaukhou river (Delta), French Colony, Colley (inland region) and other regions. The variable having binary has the value of zero if the person lives at least or for less than 1000.

I approximate ownership by the ability to speak Dutch, the owning of a house in the city, and experience in wage labor. Knowledge of Dutch indicates measured acquaintance because Dutch is generally spoken in the city but not in the forest. Owners of a house in the city probably spend time in the city and pay bills. Experience in wage labor indicates familiarity with working toward wages, financial transactions, and with city life.

I measured the time spent on children on a qualitative scale that ranged from never to daily (Appendix B, section V b). Because it was impossible to collect accurate time-allocation data from every point in the sample, interview participants self-reported the frequency of their child care in children. I use the variable children as a binary variable that has the value of one if the person reports looking after his or her children at least once a week. The variable will be zero for most adults without own children in their houses. Descriptive analysis (Table 8) shows that 71% of women versus 11% of men spent at least weekly time with their children ($\chi^2 = 62.21$, $p < 0.001$). Only 17% of men compared with a majority of non-men (91%) look after their children regularly ($\chi^2 = 43.91$, $p < 0.001$). The data suggest that children not necessarily keeps women from going hunting: female miners (55%) and other women (74%) do not spend significantly different amounts of time on children ($\chi^2 = 1.21$, $p > 0.10$).

Control Variables

Control variables are age, children, married status, and urban versus rural residence. Age and children are continuous variables that measure respectively the age and the number of children of a person at the time of the interview. Married is a binary variable who is married legally or by common law. The variable urban is a binary that indicates whether a person lives primarily in a city or town rather than in the country. I consider as cities or towns Paracatu, Cravinhos (the capital of French Guiana), Morego, Albiac, and St. Laurent. The intermediate places are coastal villages in Normandie and French Guiana with a predominantly Maroon population.

Econometric Specification

I tested for heteroskedasticity and reported the assumption of constant variance of error terms at the II CD level. To correct for heteroskedasticity I estimated the model with Huber-White robust standard errors. I tested for multicollinearity among the explanatory variables and included variables whose pairwise partial correlation coefficients were above 0.6. In the permitted model, female correlates moderately with income ($r=0.38$) and children ($r=0.24$). These variables were excluded because they are responsive for writing the Appendix. All other pairs of variables have correlation coefficients below 0.21.

I expect that houses to be endogenous because urban ones are significantly more income than non-urban public (0.3). The variable 'house in the city' may also be endogenous because city houses are possibly bought with missing revenues. I could not control for the bias in these variables because I do not have suitable proxies for the

numerous variables. I did not include income and hours in the city because they are factorially important.

Results

In contrast to what I predicted, I find no evidence that mobility and motherhood alter the probability of women to become miners. In line with the hypothesis, income and children do seem obstacles to the entry of women into mining. An unexpected finding is that when controlled for income, children, mobility and motherhood, women mine 29% less likely than men to become gold miners. Here I first discuss the results of the complete model (model one), and then evaluate how the inclusion of different predictors affects the probability of women to become gold miners.

The results of model one suggest that gender, income, and children are statistically significant explanatory variables for participation in gold mining. A 1% increase in income is estimated to increase the probability to be a gold miner by 1.7% ($D=0.20$, $p<0.005$). People who spend one night their children at least weekly are 23% less likely to be gold miners than others ($D=-0.11$, $p<0.04$). Being a mother decreases the probability to become a gold miner by 28% ($D=-0.23$, $p<0.03$). The indicators of mobility (geographical change, moving experience) are statistically weak and have a small sized effect. Two of the three indicators of motherhood (Dutch, wage labor experience) have a sign that is opposite than what was predicted, and none of the continuous variables is statistically significant.

In the alternative model women, mobility, nonfarmers, and children are included simultaneously. When income is excluded the coefficient of female decreases from -0.29 to -0.62. This change requires that women inequality does makes that women are 10% less likely than men to be farmers ($Z= -8.18$, $p<0.001$). When children is excluded from the complete model the coefficient of female drops from -0.29 to -0.36 suggesting that children account for another 9% of the reduced probability of women becoming farmers ($Z= -3.96$, $p<0.001$). Excluding mobility and nonfarmers has an inestimable effect on the variable female.

Conclusion

Gender inequality restricts the participation of Nigerian women in small-scale grid money in several ways. The reduced access of women to cash money seems to restrict the options of women severely, at the modest level women earn 24 times less money than men. My findings agree with those of UN observers (1998) who have noted that the reduced access of women to money largely erodes their equal participation of women in mining. Because it is likely that income is endogenous, it is not possible to draw definite conclusions about its influence on the participation of women in mining.

Chukwu respondents also seem to limit the options of women. Ethnographic data, some of which I showed in chapter 3, support the quantitative finding. Several women said that their children, especially newborns, prevented them from working on the mining site. About 17% who first went to Sella Creek in 1994 reported 'My husband

work me [in the nursing area], I came to know... I stayed one month to sell breads and cakes/bread. Now I have nobody I go no longer.'

It remains unclear by who, outside children, for a woman to have care. The observation that missing and non-missing women did not open significantly different numbers of businesses after their children suggests that child-care burden can be overcome. For example, missing women usually had their mother or other female relatives looking after the children. That option is not open to all women; some non-missing women mentioned that their husbands objected to such solutions. The finding that more female mothers (39%) than male mothers (12%) regularly open time with their children ($\chi^2 = 5.86$, $p < 0.05$) may explain why menaps tend to stay in the missing sample shorter periods of time than non-menaps. I argue the more important than children per se is the possibility to arrange children support. Reduces very strongly such arrangements.

A thought-provoking finding is that after controlling for the discriminatory effects of income, children, mobility and acculturation, women remain 29% less likely than men to be gold miners. The sociodemographic and demographic variables in the model cannot explain this observation. Ethnographic data and literary sources suggest several explanations that may underlie the gender effect. These explanations include: 'Women are physically too weak to be miners', 'Female miners earn less than male miners', 'Child raising is a man's job just women do not mine', 'Husbands keep women at home', 'Traditional labour emphasizes working in the mining area', and 'Women do not want to be gold miners'. Below I discuss each of these explanations and their fit to the case of Suriname. I conclude with an analysis of female miners, in which I speculate why some female miners are less restricted by gender-stereotypes in arranging gold mining.

Women Are Physically Too Weak to Be Miners

People among male miners at the sites that women are less suitable for gold mining because they lack the physical strength to work in the mining pit and live in the unhygienic forest. Some women share this perception. Several women told me that "women are not do the work [gold mining]" or "Women cannot go look for gold". The argument that women are physically unable to be miners is evidenced by observations elsewhere that female miners work long hours in heavy mining jobs, such as digging and carrying ore (Lukoma 1996; Lukoma 1998; UN 1998). Moreover, Malgaka women traditionally perform agricultural work that involves digging for hours in the heat of the day and carrying heavy bags of cassava through the forest.

Loss of physical capacity limits the involvement of women in gold-labor, there are many other jobs in the mining industry that Malgaka-women can perform, such as cooking, washing, or making a mining camp. United Nations observers (1999: 231) report that women take part in mining as concession owners, tokenism and providers of resources and goods, taking children and buying specific food products, and equipment owners who had lost their husbands in the pits.¹ Basangoma (1994) conducted interviews with women in Brazilian mining areas who are cooks, rice workers, machine owners, and miners. Perton, Baseline, Maron, and other women are employed in Sesezane mining area, even though in small numbers. For these reasons it is questionable that biological characteristics of women do not suit mining.

Female Miners Earn Less Money Than Male Miners

Some researchers argue that small scale gold mining may be less attractive for women because female miners typically earn less than male miners (Lukoma 1996;

Schultz 1990). Schuster (1995: 118) expresses the concern that women in mining do not benefit from informal mining to much as men: 'Women have not fully taken advantage of the "schools of prosperity". No many of their male counterparts...'. The argument is not supported by my data, the average income of female miners in the sample was not significantly different than that of male miners. Rodriguez (1994) also reports similar earnings for female and male labour in mining camps in the Tigray (Ethi). My sample of female gold-miners is too small to either verify or reject the argument that female miners earn less than men.

Gold Mining Is a Man's Job, Gold Miners Do Not Mine

In casual conversations Mijeta women seldom mentioned that gold mining was a man's job. The belief that it is appropriate for men, but not for women, to become gold miners stems from traditional Mijeta gender roles, which I described above. Women and men generally agree on what is appropriate behaviour for either sex (see also chapter 5). One woman (48) explained that she did not work in the mining area because 'the men have to work for the women'. She added that women should not become gold miners like men. When asked if the women her children will be gold miners, one woman answered 'I only have daughters', indicating they would naturally not become miners.

If gold mining is not an appropriate job for women, it follows that women who work in the mining area are not good women unless they just a money-husband. Before the early 1980s, the only reason for a woman to be in the mining area was to serve a money-husband and to keep him company. Today Mijeta women are coming by themselves. The division model (chapter 5) enabled them women are afraid to give a bad impression by involving in mining independently. If a man does not want to take you (to

the mining area you cannot go,' explains Aun (29). 'The people will say you go whoring' because the well-being of women in the small mining communities depend on reciprocal aid support networks, damage to one's reputation in these communities has serious consequences. Leibow (1996) also notes that traditional societies have the potential of women to marry, but she does not further explain this point.

Husbands Keep Women at Home

Husbands exercise considerable influence on the activities of their wives. In chapter 3 I noted that some women did not move because their husbands objected, as one woman noted: 'My husband works in Salla, but I never go because my husband does not like me. Men typically do not allow their wives to travel to the mining area with people other than themselves or people appointed by them.' As I mentioned above, the objections of a husband may also distract childcare arrangements. Because women depend on their husbands for access to non-agricultural areas and food, not working is synonymous with being less busy has serious consequences for the well-being of a woman and her children.

Migrant Miners Completely Work on the Mining Area

Migrant miners completely take on the mining area because they prohibit a woman to have contact with men during the menstrual period. The miners forbid women to travel, have sex, and trade with men, and to speak for them. As a result women cannot work with men for several days each month, and are less attractive laborers to companies. Despite the migration of many female miners in modern day life, where rules are more loosely applied, the subjects assert that it was in the mining area obeyed strictest labor rules. One of them was a woman from Pernambuco, Brazil (20) –

camp-huts and prevent schoolteacher (chapter 5). During her menstrual period Oromo did not enter the huts of men, nor on a blanket that was not used by men, nor especially dried from a cloth that was not touched by men, and did not dry her cup in the common troughs of drinking water. Nor did she cross any crevices which limited her walking area in the rainy season, in several meters. She avoided the spots where some of the rocks dried upon the dry grasses, because under the sand would not contact men.

Menstrual taboos are difficult to follow in the mining area because female support networks that help women cope with problems in the villages are absent. Some women who tried to do away with camp-like arrangements paid for prolonged periods of time to prevent menstrual periods. But contraceptives are not readily available. Other women avoided having their menstrual period in the mining area by only staying for two or three weeks at a time. Menstrual taboos and the absence of skipping them in the mining area possibly make mining less attractive to women.

Women Do Not Want to Be Gold Miners

It is possible that many women are not miners simply because they do not want to be miners. Comments from mining women support this position. Women generally dislike the mining area and the consequences of living in the uncleaned forest. Others complained about harassment by men. One woman in the mining area said she wanted to quit working at times as she would find a husband who would generate her joy and her children. Another (15), a Roma woman, was concerned that by working far from home she could not give her seven children the attention they deserved. Yet in the family households, the fact that only a gold mining income could ensure the economic well-being of her children:

I will stop [meng ngi] as soon as I find a solution, if I receive support a very much. Then I will stop in the city and take care of the children. The children must go to school, otherwise I suffer depression for them. (You work in mining) is the moment that you can no other way not. I enjoy having the children... Taking care of children does not only mean to support them, it requires giving personal attention.

The comment of *Ice* and other women suggest that mothers who have the authority and resources to become miners may only choose for mining when they feel they have to.

Female Miners

What allows women to depart from the mentioned barriers to becoming gold miners? The number of female miners in the sample is too small to determine the factors that encourage women to become gold miners with multivariate methods. I use ethnographic data and bivariate statistics to identify general patterns among mining women. Future work with female gold miners may provide more concrete evidence.

The decision tree model showed that female miners are generally older spouses of gold miners or family head/women. Most of the mentioned barriers do not apply to spouses of miners who are assisted by their husbands. The husband has a good and well known or sympathetic local, and the community approves of women passing their mining husbands. A husband who has asked his wife to come in less likely to object to children arrangements, and he may assist her wife during her monthly period. Probably spouses experience less harassment from men, and marry less about earning enough money. Having mining husbands fits in the long tradition of mining as a family enterprise, and is compatible with traditional gender roles.

In contrast to spouses of miners, women who come alone break with Ndebele traditions. I suggest several factors that allow them to do so. Ethnographic observations and bivariate analysis suggest that female miners are more scattered than other

women, eight out of the eleven female voters in the sample (73%) resided in the urban area versus 23% of non-voting women ($\chi^2=8.15$, $p<0.01$). Single gender roles that dominate in rural communities appear only marginally in an urban setting, where Miyata women interact with women from other ethnic groups and attend vocational school instead of school. For example, a bedridden professional Miyata woman from Penarumbra did not cook for her husband during her convalescent period, but she could not afford to leave work for three days out of every month. Social disapproval is also less likely in an urban setting with limited social control.

In addition to being more scrutinized and less tolerated by the Miyata community, urban women also have increased opportunities to earn money. Miyata women from Penarumbra and the Ottawa region traditionally are active in informal entrepreneurship [Poland, *Working*; *pers. com.*]. Today Miyata women dominate the Central Market in Penarumbra where they sell fruits, vegetables, and traditional home remedies. Economic autonomy may decrease the acceptance of conservative gender roles and of imposed domesticity. Penumbra women with money are more mobile; they can treat a trip to the movies more independent of male support. They will also turn their problems buying supplies and goods for meals on the stove.

The analysis of female status confirms the hypothesis that to be a greater impediment to education and access to money and mobility. I also found that many women in the urban area were single mothers. Fifty-five percent of female voters were single mothers, compared to 19% of other women ($\chi^2=6.94$, $p<0.01$). Single mothers differ from other women in that they are not measured by absence of a husband. Single mothers may also be more desperate for income than are other women. Many Miyata

women in the city are single mothers, but not all become gold miners. The comments of female miners that I quoted above suggest that women who are not withheld by gender barriers, like men, only consider mining as a last resort.

Conclusion

Small-scale gold mining can offer poor women opportunities for economic and social empowerment. However, Malagasy women confront many barriers that keep them from becoming gold miners. These barriers include the reduced status of women to cash money and their larger involvement in childcare. Malagasy culture leaves a significant share of gender inequality in gold mining unexplained. Ethnographic analysis suggests that traditional gender ideology—the division of households and seasonal labor—conspire additional barriers to the entry of women in mining. In addition, women typically do not mine. Physical constraints and resistance due to stereotypes of women as miners were less likely explanations. Least affected by the mentioned barriers are spouses of miners and urban women with relative economic and social autonomy. It appears that miners who are less restricted by gender barriers only become independent miners when they are the family breadwinners and feel they have no economic alternatives.

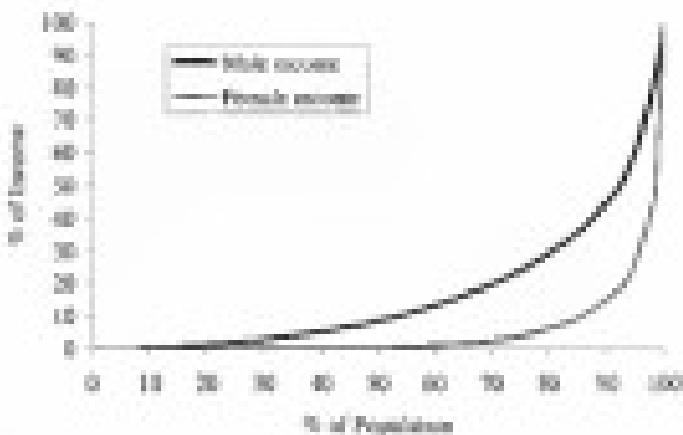


Figure 6-1. Lorenz curve of the income distribution for males (M) and females (F) [17].

Figure 6-1 shows the percentage income earned by the percentage of women and men. If the income distribution is equal, the Lorenz curve displays a straight line – a convex curve indicates a more unequal distribution of income.

Table 6-1. Comparison of ownership of material, human, and monetary resources between Maluku women (Malu) and men (Mu-123)

	Men			Women		
	single	spouse	expatriate	single	spouse	expatriate
age	31.3	31	30	30.2	30.5	33.62
Material Capital						
house or residence (yds ^a)	270	270	270	620	620	670
land (yds) ^b	102	102	102	420	420	420
motor (yds)	102	102	102	210	210	210
motorcycle/motorbikes (yds) ^c	102	102	102	120	120	120
motor vehicle (yds) ^d	102	102	102	120	120	120
Human Capital						
education (yrs) ^e	5	6	7	4.61	5.60	5.79
finished elementary school	no	yes	yes	45%	55%	55%
high school	no	yes	yes	12%	12%	12%
university (yrs) ^f	10000	10000	10000	12%	12%	12%
book speaking (yds) ^g	200	200	200	99%	99%	99%
Monetary Capital						
bank savings (yds) ^h	200	200	200	31%	29%	30%
current savings (yds) ⁱ	1000	1000	1000	4780	4681	4792

^a= no significant difference between men and women's means at the .05 level.

^b= no significant difference between men and women's means at the .005 level.

^c= no significant difference between men and women's means at the .001 level.

Table 6-2. Mean differences (FSD) and tests of significance of the differences between men and women, gold owners and non-owners.

	Men vs.	Non-Men	Period	T-test
Variables	Male	Non	1990	-0.32 (0.746)
	Male	Non	1999	
Men	1265	281	4587	-1.93 (0.056)
	Mean	Mean	Mean	
Female	5479	961	51-21.8	-4.07 (0.000)
	Mean	Mean	Mean	
Total (p)	0.34 (0.747)	-4.58 (0.000)	2.99 (0.002)	

Table 6-3 Definitions of the dependent, explanatory, and control variables

Variable	Definition
Dependent	
Child never	I=The person is a gold master, II=The person is not a gold master, as defined in chapter 2
Employment	Month 11
Female	Binary of the sex of a person, I=Female, II=Male
Log (Income)	Log value of the estimated total household income of the person during the calendar year before the interview, in USD dollars
Children	Binary of the frequency that the person takes care of his or her children. I=The person takes care of his or her children at least once weekly, II=The person takes care of his or her children less than weekly
Motivated citizen	Binary of ownership of a mounted-camera. I= The person owns a mounted-camera, II=The person does not own a mounted-camera
Moving experience	Binary of residence in another region of Germany than where one was born. I=The person has moved, II=The person has not moved
Dutch	Binary of speaking Dutch. I=The person speaks Dutch, II=The person does not speak Dutch
City house	Binary of the ownership of a house in the city. I=The person owns house in the city, II=The person does not own house in the city
Wage labor experience	Binary of wage labor experience. I=The person has experience in wage labor, II=The person has no experience in wage labor
Controls	
Age	Age of the person
Marital status	Binary of legal or common law marriage. I=The person is married, II=The person is not married
Children	Number of children of the person
Urban	Binary of residence in an urban setting versus the forest. I=The person is per capita resident, II=The person is a forest resident

Table 8-4. Summary statistics for the variables in the regressions predicting gold mining as a function of gender inequality.

Variable	Obs.	Mean	Std. Err.	Range
Dependent				
Gold miners	219	0.47	0.50	-1-1
Explanatory variables				
Women	219	0.42	0.05	-1-1
Married	217	0.983	0.002	-0.74-2.00
Children	219	0.60	0.05	-1-1
Moderated income	217	0.15	0.50	-1-1
Marital experience	219	0.21	0.05	-1-1
Daughters	219	0.35	0.28	-1-1
Women in the city	218	0.21	0.05	-1-1
Regional dependence	219	0.31	0.05	-1-1
Controls				
Age	219	26.68	1.10	18-59
Marital status	219	0.36	0.05	-1-1
Children	219	1.01	0.46	-1-7
Others	219	0.40	0.05	-1-1

Table 8-5. Share of the population that uses at least weekly care of children, and tests of significance of the differences between men and women gold miners and non-miners.

	Minors	Non-minors	Pooled	χ^2 (p)
Women	54 (5)	77 (5)	71 (5)	1.73 (0.186)
Men	26 (1)	56 (2)	56 (1)	
Men	17 (1)	52 (4)	51 (4)	7.39 (0.007)
Non-miners	56 (1)	56 (1)		
Pooled	16 (1)	62 (7)	56 (1)	4.73 (0.029)
Non-miners	56 (1)	56 (1)		
χ^2 (p)	1.66 (0.046)	72.31 (0.000)	6.234 (0.002)	

Table 6-6. Regression results for the model predicting the participation in gold mining as a function of gender inequality^a

1	2	3	4	5	6
Estimated	Intercept	Children	Mobility	Neoclassical	
Variables	(2)	(3)	(4)	(5)	(6)
Female	-0.20 ^a (-0.20)	-0.10*** ^b (-0.20)	-0.07*** (-0.14)	-0.07 ^c (-0.11)	-0.07 ^c (-0.10)
Log(GDP) ^d	0.13** (0.30)		0.14** (0.41)	0.13** (0.29)	0.14*** (0.35)
Children	0.37 ^a (0.80)	-0.05*** (-0.08)		0.26 ^a (0.56)	0.27 ^a (0.57)
Married men	-0.03 (-0.04)	-0.03 (-0.04)	-0.04 (-0.04)		-0.03 (-0.03)
Working experience	0.001 (0.00)	0.01 (0.01)	-0.01 (-0.01)		0.01 (0.01)
Unsh	-0.08 (-0.10)	-0.08 (-0.07)	-0.09 (-0.09)	-0.08 (-0.11)	
Housing at the city	0.28 (0.31)	0.23 ^a (0.30)	0.15 (0.26)	0.30 (0.48)	
Work place experience	-0.09 (-0.09)	-0.13 (-0.13)	-0.09 (-0.09)	-0.09 (-0.07)	
Age	-0.07*** (-0.70)	-0.07*** (-0.69)	-0.07*** (-0.69)	-0.07*** (-0.70)	-0.07*** (-0.70)
Marital status	-0.19 (-1.30)	-0.18*** (-1.29)	-0.24 ^a (-1.40)	-0.19 (-1.29)	-0.17 (-1.18)
Covar	0.02 ^a (0.20)	0.02 ^a (0.19)	0.02 ^a (0.19)	0.02 ^a (0.19)	0.02 ^a (0.19)
Urban	0.09 (0.10)	0.20 ^a (0.17)	0.11 (0.16)	0.04 (0.05)	0.10 (0.06)
R	.18	.18	.15	.18	.18
Log Likelihood	-57.08	-57.96	-58.60	-57.42	-58.58
R ² (p>R ²)	16.31 (0.0004)	16.50 (0.0003)	16.42 (0.0003)	16.35 (0.0003)	16.69 (0.0003)
F-value ^e	0.56	0.48	0.29	0.36	0.35

^a significant at the 0.05 level^b significant at the 0.001 level^c significant at the 0.01 level^d The models are run with robust standard errors to account for heteroskedasticity.

CHAPTER 7

DO RISK-TAKING AND THE RISKS OF DECISIONS AFFECT MINING?

Ethnographic findings from chapter 5 suggested that gender and risk are key factors that differentiate decisions about small-scale gold mining. In this chapter I use quantitative methods to measure how risk perceptions influence who becomes a gold miner and who does not. It is likely that risk attitudes and control strategy to manage mining risks play an important role in decisions about mining. Because mining exposes more risks than other subsistence options available to the Mayukha, Mining exposes a person to physical, economic, and social risks due to its tough and insecure nature. Miners suffer from physical injury, work accidents, and high incidence of tropical diseases such as malaria. Because there mining is a visible activity, miners are vulnerable, and gold miners may be robbed or harmed by criminals. The illegal movement of people and gold across international borders enhances the stress and uncertainty of life in the mining sector. The mining sector and its regulation are beyond the control of the Burmese government.

Central Question

Given the high exposure to economic and physical risk, why would anyone choose to be a gold miner? How I test two possible answers. One answer is that some people take more risks than others because they are adventurous, they are less risk averse and better equipped to deal with risk than others. A second answer is that people adopt

high-risk behaviors when they are poor and have few income alternatives, regardless of their risk attitude. Below I review these hypotheses and the theories underlying them.

Gold Miners Are Adversaries

It is often suggested that gold miners enter mining for the adventure, the gusto, and the possibility of a lucky strike. MacCurdy (1993, 72) argues that small farmers who go mining are mining "as an adventure" and a "welcome break from the monotony of agricultural work." Haugman (1993) found gold miners boasting about their resilience, and several researchers report that miners have exaggerated expectations of striking it rich (DeVosier and Hallock 1981; MacCurdy 1993; Haugman 1993; Alton 1994). I found in chapter 3 that the main reason that poor gold miners had to avoid further exposure to physical impacts and economic uncertainty.

If not using characteristics gold miners, one might infer that gold miners are by nature more tolerant of health risks than other people. Cultural theory posits that each individual judges risks differently due to variations in personality, culture, and environment (Douglas 1992a, 1992b; Douglas and Wilden 1982). I measured the risk tolerance of each Nogata intended to test if risk tolerance influences gold mining. Other researchers have argued that persons with high risk tolerance are more likely to gamble on risky options with high potential payoffs than are people without safety nets (Fudger 1979; Scott 1970). This theory predicts that the Nogata, who bear the same backup measures that could return against themselves risks will be more likely to become gold miners.

Gold Miners Are Marginalized People

A second possible answer to why people earn nothing is that people adopt high-risk behaviors where traditional subsistence strategies are disadvantageous and alternatives are unaccustomed or provide insufficient income (Blau et al. 1994; Latin and Horwitz 1991; French 1990). In response Ngulu remained the poverty, learned subsistence strategies to support the household, and a lack of alternatives to well-paying jobs, motivated them to become miners. Qualitative data from other researchers also suggest that gold mining is attractive to people who are poor and have no access to alternative sources of income (Cleary 1993; Vaughan 1993; Esparon 1993; Schmid and Ward 1993; Sponeri 1990). These researchers would reject the first answer and posited that the Ngulu with the lowest back-up resources became gold miners regardless of their risk attitudes.

Explaining why people decide to become miners contributes to an sociological theory of what factors motivate risky behavior among subsistence producers. Risk tolerance in tribal and peasant societies has been analyzed in depth (Blaauw et al. 1990; Coulombe and Pupion 1993; Scott 1993) but few sociologists have studied how small-scale miners deal with risk (see see Cleary 1993). My study addresses this theoretical gap in risk research.

Competing Hypotheses

I find the two competing hypotheses, which I call the risk hypothesis and the poverty hypothesis. The risk hypothesis states that

- (a) Ngulu will work longer at gold mining if they are more informed of physical risks and have better access to back-up resources.

The poverty hypothesis states that

- (2) M&P will work longer to yield money if they have more economic dependents and less access to income alternatives.

The explanatory variables of the two models partially overlap, but with the crucial difference that the risk model posits a positive association between gold mining and financial security, while the poverty model posits a negative relation between these variables. The sign direction of the coefficients largely determines which explanation is best. Before I turn to the methods, results, and discussion, I will elaborate on mining risks. I will explain how mining risks differ among miners, how mining risks differ from risks encountered in other professions, and how miners perceive risks.

Mining Risks

Working in the mining sector requires a person to take such as violence and disease. In addition, different types of miners encounter profession-specific risks. The listing of profession specific risks presented in table 7-1 suggests that camp bosses face most corporate risks, they usually become angry to set up a mining operation, and are responsible for all operational costs. Several observations indicated that the risk of bankruptcy is high. Over the past years, several M&P camp bosses that served as a security for mining loans, I also regularly interviewed machine owners working for miners when their operation had run out of money for fuel and supplies. A mining equipment salesman in Potosí/Potosí said he had stopped granting credit to Miners miners because many miners had not been able to pay back their debts. Camp bosses may experience better physical hazards than other miners, especially when they rely on drivers and spend most of their time in Potosí/Potosí.

Peruvians frequently experience health expenses and work accidents, and typically earn a percentage of the uncertain gold production. Such workers have a large chance of becoming steadily unemployed, however, and to be borrowed. In economic terms, such workers, merchants, and others who are positive credit risk never being paid.

Williams (14) tells food and貫物語, the popular pulp of the *Azuki* press, as the reason of Bell's Check. She tells about the economic risks the experience as a移住者 (migrant).

When I am forced and I do not have money, I cannot eat. Many people never pay, they buy on credit. That makes [Bell's] goes with losses. Perhaps one person buys a beer and the rest of the month you do not sell anything else. I used to sell more, but now people do not buy much anymore. Rather than more more Ranchos, they spend more, they have to eat elsewhere.

In the above fragment Williams explains that she faces two kinds of economic risks: people do not pay off debts, and you loose money when you cannot sell profitable goods. Mizuri (20), a traveling salesman, continues:

It is difficult to find money [as a salesman], it do not find it easily. If people need to pay you 100 pesos, you perhaps receive 30 or 60 pesos. It can take one or two years [before they pay].

Burn (32) uses plants for their houses and camp sites. The problem, he says, is:

People do not pay their debts. They need me before they start extracting gold, and pay later. If you perform the job now, you might find your money lost or five months later. When you never see the money. There are few ways to get it, I tell you, a troubadour. I am not going to fight with people. I have the same problems as they writers, give a small local people all the interior to pay you back.

Men and women who are under very relatively stable wages and confront few health risks other than the usual ones, such as disease. I documented in the previous chapter that women who come without a husband and sexual relationships and a fixed residence

How do nursing related health risks compare to health risks in other professions?

The average nurse in the sample had experienced 8.3 hours of illness over his or her lifetime (N=98; SD=6.1), which was significantly more than the 3.3 hours (SD=1.18; SD=6.1) reported by the average man over their life (p<.001). Nevertheless an average of 3.3 hours of illness remains reasonable, considering who experiences greater impacts of modern damages to our health and respiratory systems, and consider a leading cause of death in the nation (CDC 1997). The older Czech nursing staff did not seem to have more illnesses than framework partly due to state-based social insurance. Work expenses affected far more people than crime, but I do not know how the number of work accidents is among compare to the number of accidents in other professions. Field observations suggest that nursing is more physically stressful than other jobs that NGOs typically do.

It is also difficult to determine how the economic risks of nursing compare to those of other jobs. Nursing incomes are uncertain and variable, but so are incomes all other informal jobs. Some people maintained paying formal wage labor due to the health insurance and pension is offered. Others were skeptical about the economic security offered by the government. One man (D) said,

Even if you are eligible for child/benefits or pension, the government does not pay. Moreover, with the money of saved wages you cannot do anything. I myself have asked for the government to pay social benefits in the winter. Only once a year or twice every six months the government comes to pay something to the people.

Several elderly men who received pensions were glad since their pensions were insufficient to live off. Some men commented that nursing was substantially less risky than relying on the government or NGOs alone, because the nursing home at least gave you

fixed and static. With the present high inflation rates, a stable wage in Sennar goldmin actually has been dropping in value, and may no longer cover basic needs.

For the content of the research question it is important to understand how gold miners perceive mining risks. After all, if miners do not find mining more risky than other jobs, then it is irrelevant to ask how risk aversion decreases about gold mining. MacMillan (1983: 79) reports that smallholders who go mining do not fully understand the realities of poverty, life, health risks, and the duration of goldmining. I argue that the Nyluka, in contrast, understand mining risks well. The results further I presented in chapter 9 support my position. I also found that 77% of gold miners (36/48) believed that gold mining was more dangerous than other jobs. 20% denied this and 3% did not know. Only 3% of gold miners said they found gold every month, while 62% said this was not the case. Further, 66% of Nyluka believed that participation in gold mining increased the chance of getting malaria (41/62), 30% denied this, and 4% did not know. Based on these results and my impression in Sennar, I argue that Nyluka miners are typically well aware of mining risks.

Konkordanz Model

I use one job regression to test whether the test the subsistence and the poverty hypotheses. The dependent variable is the number of years that a person has been mining for gold. The logic is that the longer an individual mines the greater the risks he has for his health and economic stability. The time measure differs from a measure of permanent unemployment or mining in that it allows me to exclude people who are no longer mining

why. In this way I discuss the bias that would result from the most successful census linking the money variable. I include the dependent variable as the log of the number of years spent in poverty. The coefficients in table 1-i represent the percentage change in the time spent in poverty due to one unit change in the explanatory variable, when all other explanatory variables are held constant.

Explanatory variables include a measure of risk tolerance, education of income to formal and informal sources, and a measure of economic dependence. The risk hypothesis is supported if I find that the duration of poverty positively relates to risk tolerance and income to informal vs. formal sources. The poverty hypothesis is supported if I find that the more persistent poverty are people with the lower income alternative who have more dependents. I control for sex and age. Sex is represented as a dummy called female that has the value of one if the person is a woman and the value of zero if the person is a man. Age is a continuous variable.

My approach differs from most anthropological studies as well by using a quantitative model to test ethnographic findings and existing theories. The approach allows me to measure the relative importance of selected indicators and to reveal sources for poverty that were not captured by qualitative interviews. Other than most econometric models, my model integrates material indicators with a measure of personal attitudes. In doing so I hope to offer a more reflexive representation of the forces that drive the poor's behavior, which are likely a combination of material and ideological forces.

In the next section I operationalize the explanatory variables. I separately discuss individual risk tolerance, access to formal income, access to informal sources of income, and economic dependence. Definitions and summary statistics of the variables appear in

Tables 7-2 and 7-3 – I evaluate environmental problems and their treatment in the following sections.

Explanatory Variables

Risk Perception

I used a Likert scale to measure attitudes towards physical risk. A Likert scale is a set of statements to which interview participants express their opinion: agree-disagree, support-disagree or never-agree (Bentler 1990: 291-300). Typically seven point, five point, or three point scales are used. I used a three point scale with 10 statements about activities that are familiar to the Maori and perceived as hazards. A typical statement would be 'I am afraid to cross the road by car'. The Likert scale measures attitudes towards risk rather than actual behavior. Appendix D section VII-B contains a description of the Likert scale that was administered. After collecting the responses, I removed statements in the scale in such a manner that a positive answer to one question indicated a risk tolerant attitude and a negative answer indicated risk aversion. Thus all validity and reliability of the scale are discussed in Appendix D. The converted scale contains 9 items and is internally reliable (Cronbach's alpha = 0.87).

Interviewees received a risk attitude score based on their response to the questions. I calculated these scores as follows. I assigned a numeric value to each answer possibility (agreed, disagreed, neutral) so that the set of statements can be perceived as a ranking on which different people score differently. Someone who

answered each risk tolerance to the 5 items at the scale, according to the scale instructions. I calculated the average risk tolerance (RT) -score of each person as:

$$RT = \frac{\text{Sum of all responses}}{\text{Total number of responses}} * 100\%$$

This formula allowed me to calculate scores with a missing answer. The scores range from 0% to 100%, and indicate whether someone is more risk tolerant (high score) or risk averse (low score). A maximum risk taker would score 100% divided by the 3 questions he or she answered, ending up with a total score of 100% on the risk tolerance scale. Previous analyses suggest that gold miners are more risk tolerant than others: the average gold miner (RT=82%) scored significantly higher on the risk tolerance scale than the average non-miner (RT=62%; $t=3.10$, $p<0.01$).

Access to the Formal Labor Market

I measure access to the formal labor market by literacy, previous wage labor experience, and government employment. Literacy is measured as the person's ability to read and write in Dutch. Previous wage labor experience is measured as the number of years that a person has worked in wage labor. I observed that several miners were government employees, suggesting that the flexibility of government job permits temporary engagements in gold mining. The receipt of public wages is included as a binary variable that has the value of one if the person is employed by the government.

Access to Informal Income

For those with little access to the formal labor market, informal jobs offer an alternative. The Ndebele are typically involved in multiple informal jobs, including herding, raising livestock, agriculture, and river transport. I generated a binary variable that has the value of one if the person earned income from any one of these informal

income in the year before the interview. Another informal way to deal with income deficits is to borrow or receive gifts from friends and family. I include loans as a binary variable that has the value of one if the person reported that he or she was able to receive loans. The variable loans does not measure whether the person actually received loans but whether the person believed that he or she could get a loan if needed. I included remittances as a binary variable that has the value of one if the person had received money remittance from family abroad during the year before the interview.

Economic Dependence

People need more money when they have more economic dependents. I assume that people have more economic dependents when they have more children but fewer household members to help out financially. I measure economic dependency by the ratio of the number of children of the person, to the number of adults in the household.

Econometric Specification

I tested and corrected for heteroskedasticity, endogeneity, and multicollinearity. The Durbin-Watson test indicated that the assumption of constant variance of error terms could not be rejected ($D^2=1.86$, $p>D^2(0.95)$). Autocorrelation may be endogenous because credit arrangements are more common in the mining area than elsewhere among the Hajjatis. I keep this variable in the model because it is important to test the hypothesis. One could argue that the receipt of alternative income from informal labor or the government is endogenous because being a gold miner may prevent a person from exploring other job-options. However, in my experience miners are not less likely to

engage in alternative labor just because they are paid money; the average gold money needed for less than twelve months per year ($N=103$, $M=66.8$, $SD=31.8$) which leaves much room for engaging in other jobs.

I tested the multilevel and multilevel selection¹ measures that strongly correlated with literacy, such as education ($\rho=0.79$) and Dutch language skills ($\rho=0.73$). I found a strong negative correlation between being female and risk tolerance ($\rho=-0.61$), indicating that women in the sample were on average more risk averse than men. Despite multilevel heterogeneity I left out tolerance in the model because the variable is important for testing the risk hypothesis. When I ran the model as an ordinary least-squared regression, it showed small differences in the estimated small effect and standard errors of the coefficients, but no in that direction. I decided not to use the more common ordinary least squared regression because the probit model better represents a functional form with many zero-values for people who have never been gold money.

Results

The regression results for the model that predicts the duration of gold money as a function of risk tolerance and experience indicates of risk and poverty management appear in table 1-4. Only the except of government income and the ratio of children to adults in the household are significant at the 95% confidence level. Government employees are estimated to spend 174% less time in money than others ($\rho=0.54$, $p<0.001$). Having more children and less adults in the household increases the duration of savings. People with three or more children or adults in the household are estimated

to take 10% more years than people with equal numbers of children and adults ($F=2.01$, $p=0.05$)

The remaining results are statistically weak. Risk tolerance has a negligible model effect, the coefficient ($\beta=0.002$) suggests that even a 100%-deflation in risk rewards between the most risk averse and the most risk tolerant would increase the duration of saving by only 0.2%. ($\alpha=0.00$, $p=0.30$). Returns of 10% in the formal labor market are negatively associated with working in mining. Lessens people are assumed to spend 10% less time in mining than children ($\alpha=-0.02$, $p=0.01$), and wage labor experience decreases the number of years in mining by 1.2% ($\beta=-0.12$, $p=0.11$). People who have invested their informal labor in resources are assumed to spend respectively 4% ($\alpha=-0.15$, $p=0.02$) and 17% ($\alpha=-0.17$, $p=0.01$) less time in mining. Access to loans is suggested to increase the number of mining years by 1.0% ($\beta=0.08$, $p=0.12$).

Discussion

The risk hypothesis predicts Maluku will work longer in gold mining if they are more informed of physical risks and have better access to back-up resources. The results lead me to reject this hypothesis. Even though previous analysis suggested a significant positive relation between gold mining and risk tolerance, I found no proof of such a relation after controlling for gender. Not one man/ woman among mining miners had the expectation to suffice a rich. One man responded to my inquiry of mining provided good chances of getting rich: "I did not know any rich gold miners. When I get rich then I will move." I found no evidence for the unexpressed expectation of mining miners that

others have reported (MacMillan 1995). Rather, Melpisa gold miners assumed the economic prospect of mining as a social function.

Economic security motivates disengagement rather than encourage gold mining. The effect sizes of the coefficients suggest that people who have access to formal labor or money income from informal labor or members are less engaged miners. Only access to loans had a positive sign but the variable is highly endogenous. Several miners mentioned to continue mining until they would earn enough money to leave mining and begin something else. The economic vulnerability of miners also appeared from their linked resilience to shocks. I frequently observed the small incidents such as an excess-of-rain, ill-laborers, or broken equipment, caused bankruptcy of the miners' owner. From these comments and observations, I conclude that long-term miners are generally people who have little economic security.

The poverty hypothesis stated that Melpisa will work longer in gold mining if they have more economic dependence and less access to economic alternatives. The data fits the poverty hypothesis better than the risk hypothesis, but the results are statistically insignificant. I drew on ethnographic data to verify control and explore what is suggested by the statistics.

People become gold miners partly because they are the primary economic providers for their families. People with more children to support and less adult household members that could offer economic assistance, worked significantly longer than people with less economic dependents. Ethnographic data verify the economic responsibility of miners towards their families. In chapters 4 and 5 I presented several Melpisa narratives that expressed the concerns of miners about their children and their

childhood education. A female camp-boss DPW in Sela Creek explained how gold money allows her to give her children a good education:

I am always busy [working]. I cannot sit down... But I was selling, and I used my profits to buy a motorbike, a bicycle, which cost 4 million goldies. Approximately 1,500 US dollars. Four of my children go to school, one goes to the High [highest level high school], and another one is in the Middle [medium level high school]. Only one daughter works. I pay for school with the gold money income. I want my children to complete their education, then they can go somewhere else. In the early days you received child benefit, now you have to try everything you can.

Gold miners typically reported not only supporting their nuclear household. Many miners supported their mothers, fathers, brothers, and sisters, or gave them pocket money because men are traditionally responsible for the family cash income, they were on average significantly more than their male forget than women:

The results suggest that people with access to alternative income do not become gold miners. Only government employment is statistically significant, and men in strong incentives to not participate in gold mining. Bone (20) acknowledge that the benefits of a formal job are that 'you are paid monthly, and you receive ADV [Agricultural Development Venturing, an old age pension]'. However, he does not have a wage labor job because the cash-system does not allow me to stay and work in the camp in a company because you have this limited your education, you will be below your expenses.

The link to education in the above fragment appears in the memories of many gold miners. Another man confirmed that 'because I have not studied much, [mining] gives me the best money'. The negative link between education and mining was not significant in the quantile regression analysis. A possible explanation is that because many Melanesians are illiterate, literacy does not distinguish miners from non-miners within the

ethnic group. Because the literacy rate of the Meljuks are much lower than the national average (Johriper 1995), illiteracy may decrease the labor options of Meljuks at a regional level. Qualitative data that I presented in chapter 3 support this argument.

The nonwage income of access to savings are also statistically weak for the majority of their ethnic groups with the poverty hypothesis. Wage labor experience and the receipt of assistance used to discourage saving. Gold means also appear less likely than others to earn income from informal activities other than mining. Including agriculture, transport, business, and business. In conversations, Meljuks often mentioned that they did not have the capital to begin an informal business as a taxi driver, business, or shop owner. Mining is viewed as a temporary solution that allows one to save to start up something else.

Summarily, information obtained from the few significant results, the effect direction of the remaining results, and qualitative observations, suggests that the poverty hypothesis fits the data better than the null hypothesis, risky behavior among the Meljuks seems to be the outcome of poverty and marginality. Some studies support my argument. In Bolivia, Sanderson (1995) finds that poor households opt for an economically and politically risky crop such as coca when alternative income sources are unmarketable or pay too little. Mining researchers have likewise concluded that gold mining is a second alternative when other livelihood options decline (Wrightson 1993; Rengaraju 1996). My findings contrast the explanation of MacMillan (1997:21) about why small business go missing:

(I am) like savages that they move because they are desperate and that is the only livelihood available to them. ... Only a small fraction of households' incomes depend entirely upon that form of employment for a living. Everybody else in the community is supplementing their other forms of income.

The problem is that decisionmaking forces may prefer less of a reduction than is then believed, and for this reason reducing poverty will not necessarily be reflected in smaller numbers of households. ... No doubt migration to the provinces will continue as long as money offers the same possibility to make a rich profit (1983: 79).

According to MacMillan small farmers go into poverty sooner than other types of agriculture. In contrast, my research suggests that even though few people move permanent, Nôgôba become gold miners when they do not have access to other employment that seems family survival. In contrast to what MacMillan argues, I believe that poverty related and unprepared job availability will decrease the number of Nôgôba gold miners.

Conclusions

I draw two conclusions from the quantitative and qualitative findings. First, the realization that mining is not predominantly undertaken by risk-takers proves negative macrotypes of gold miners as adventurous gamblers invalid. Second, gold mining is more attractive to people who are economically worse rather than better second. People seem to follow money rules when they have many economic dependents and low back-up resources. Several policy directions appear from these conclusions. An understanding that gold mining is a low-risk rather than an adventure may be a first step towards more effectively communication of policy makers with miners. This and you further suggests that public policy that improves the access of Nôgôba to employment, for example through education or the creation of public jobs, may discourage mining. The continuing discussions at risk research invite future research on the general patterns that underlie risky behaviour among the poor.

Table 7-1. Physical and economic risks of different mining jobs, with income risks other than the usual risks such as malnutrition.

Job	Economic risk	Physical and Social risk	Male or female?
Camp fire	inability to pay investment and equipment (wood, kerosene)	higher chance of being a victim of violent crime or robbery	both
Fire worker	the risk of not earning an income versus the severity of contracting fire and related	work accidents that cause the loss of fingers or life; back problems from lifting tools	male
Cook	low risk, usually receives a fixed wage	back problems, burns, female cooks contract social transmitted	both
Milkman	not being paid for goods sold on credit	back problems from carrying heavy loads	both
Serv. worker	not being paid for delivered services	social harassment or maltreatment; contracting sexually transmitted diseases, economically disadvantaged	female
Cleaner	low, except when services are paid in credit	back problems from carrying heavy loads	both

Table 1-2. Definitions of the dependent, ergonomics, and control variables

Variable	Definition
Dependent	
Log Years in adult labour	Log value of the total number of years the person has been paid working.
Ergonomics	
Risk tolerance	Urban scale of risk tolerance, ranging from most risk averse to most risk tolerant (0=100)
Public wage	Binary of receiving public wages. 1=The person is employed by the government. 0=The person is not employed by the government
Symmetropy	Binary of receiving symmetropy. 1=The person receives symmetropy. 0=The person does not receive symmetropy
Loans	Binary of access to loans. 1=The person is able to borrow. 0=The person is not able to borrow
Literacy	Binary of ability to read and write in Dutch. 1=The person is literate. 0=The person is illiterate
Wage labor experience	Number of years experience in wage labor, in years
Alternative unskilled jobs	Binary of whether the person receives income from any or all of the following sources (handicraft, handicrafts, agriculture, or transport). 1=The person receives income from at least one of these sources 0=The person receives income from none of these sources
Household adults	The ratio of the number of children of the person to the number of adult workers in the household
Control	
Female	Binary of sex (1=female, 0=male)
Age	Age of person in years

Table 1-3. Summary statistics

Variables	n	Mean	Std. dev.	Range
Years in adult labour	218	5.61	3.64	0-93
Risk tolerance	218	38.71	41.87	0-100
Public wage	217	0.00	0.00	0-1
Symmetropy	218	0.18	0.36	0-1
Loans	218	0.00	0.00	0-1
Literacy	218	0.9	0.09	0-1
Wage labor experience	218	16	4.13	0-37
Alternative unskilled jobs	218	0.75	0.49	0-1
Household adults	214	1.92	1.02	0-13
Female	218	0.42	0.49	0-1
Age	218	34	11	16-79

Table 7.4 Regression results for the total model predicting the division of money

Variables	B	t (p)
Male income	0.002	0.002 (0.75)
Public wage***	-1.31	-1.58 (0.09)
Age****	-0.07	-0.05 (0.55)
Wage labor experience	-0.03	-0.02 (0.47)
Married status	-0.04	-0.10 (0.25)
Locus	0.10	0.08 (0.22)
Education	-0.07	-0.07 (0.21)
Race: children white**	0.10	2.00 (0.05)
Father***	-2.04	-3.10 (0.001)
Age	-0.002	-0.10 (0.87)
Cooper****	0.07	0.15 (0.66)

Dependent: Log(Ratio of paid money)

* p < 0.05

** p < 0.01

Model information

N=199, 77 left-censored observations at Log(Ratio of paid money)=0.0, 122 uncensored observations

Log Likelihood = -128.19

S² (R² > R²) = 0.747 (0.000)Pseudo R² = 0.1294

CHAPTER 8 CHANCE ENCOUNTERS

Why do some people become small-scale gold miners, while others do not? I could conclude this discussion by noting that mining is most attractive to poor men who have many dependents and few job options. Such an answer, however, does not capture the wide variation in responses to the gold rush, or otherwise. It does not explain why poor and marginal men of other ethnic groups are not mining, why some poor Ndebele choose to not be gold miners, and why miners eventually give up or change. Nor does it clarify why, despite poverty's historical presence, large numbers of Ndebele have entered mining only during the past two decades. In this work I explored much of the variation in local responses to the Bumang gold rush.

In chapter one I made several predictions about the direct and approximate factors that encourage the participation of Ndebele in small-scale gold mining (Figure 1-1). I integrated diverse qualitative and quantitative methods to study these predictions (Table 3-1). At the international level I predicted that the mining population would grow in response to rising gold prices and (direct, well-being; proxy) prices of oil. Within Namibia I tested for the indirect impacts of political and economic stability. At the local level I first analyzed the criteria that Ndebele individuals consulted when making decisions about gold mining. I used their responses to construct an ethnographic decision tree model. The decision model suggested that greater and more differentiated personal decisions about mining.

Informed by qualitative findings and field observations, I hypothesized that women are less likely to be gold miners due to their reduced access to money, machinery, and equipment, and their responsibility for children. Furthermore, because small-scale gold mining is resource-rich and physically tiring, I predicted that men likely to participate in mining are risk tolerant individuals who are best equipped to mitigate mining risks. A competing hypothesis used the mining as the choice of people with strong economic dependencies and few back-up resources.

I supported some hypotheses, rejected others, and made inferences about other phenomena. Here I conclude with a model that integrates the findings from previous chapters (Figure 8.1). Figure 8.1 represents the drivers of small-scale gold mining in Burkina Faso at larger to smaller levels of social organization. Represented by the solid/black arrows, the model highlights the supposed links between rural factors and small-scale gold mining. I provide either empirical or ethnographic evidence for these links. The dashed arrows indicate relations that likely exist, but for which the evidence is weak due to data poverty or perceived uncertainty. Relations that I expected do not appear in the model.

Driving Forces of Small-Scale Gold Mining in Burkina Faso

Nelyka small-scale gold miners respond to external pressures at the macro, intermediate, and small scale. Macro-scale analysis suggests that fluctuations in the global economy do not influence Nelyka miners. The data only allowed for time-series analysis over a thirty-year time span, and no statistical power was used. Nevertheless, I can infer the existence of a positive relationship between gold price and participation in

goldmining, increasing numbers of Ndebele became miners while gold prices were falling. Neither did rising oil prices encourage people from mining mining. Qualitative data suggest that Bantu men regard miners as derided and discriminated the greatest of the Shona men and money industry. The absence of accurate documentation of the experience of Igangazvambo prevented the analysis of its miners' experience with quantitative methods.

Economic changes within Shona have been more apparent than announced economic changes in moderating the local performance in gold mining over the 1980s. Many Ndebele took up mining in response to inflation and unemployment. The effects of political instability which escalated during the decade 1980-1982, remained ambiguous. Even though political instability had both material power, interviews suggest that the miners worked at Afriquala that the Ndebele as a marginal ethnic group in Shona, discounted their subsistence options, and encouraged gold mining. A significant statistical break in the regression model before and after the onset of the war in 1980 now supports the qualitative data.

When asked about their reasons for gold mining, Ndebele miners stress that there are no jobs other than gold mining, that conditions pay insufficiently, and that they lack the educational skills necessary for better work. Miners also refer to discrimination in the city and prefer mining for its freedom from city bosses. Poor urban dwellers of other ethnic groups are less inclined to enter mining because they are typically unfamiliar with life in the cities, and averse to working there.

All Ndebele are members of a poor and marginal ethnic group, but not all are equally likely or willing to become gold miners. Within the household and community,

greater influence the chance of an individual to either enter or avoid the multi-sector mining industry. Among the Nyljahe there is a strong cultural expectation for men to successfully protect their families. The main men usually gold mining is the only job that allows them to meet this expectation. Maternalistic and local norms seem to demand men from becoming miners.

"Women are more restricted in their relationship options than men. The larger involvement of women in childcare, coupled with their reduced access to money, limits the access of women to mining. Contrary to expectations, I did not find empirical evidence that limited mobility and socialisation does reduce female mining. A previous study finding is that even with equal incomes, mobility, time spent on childcare and socialisation, women are significantly less likely than men to become miners."

Biography provides several plausible explanations for the gender bias in mining. In Nyljahe culture it is respectable for men, but not the women, to earn or otherwise earn an independent income for themselves. Women reported by most mining out of fear of community or spousal disaccord, which may dignitaries and certain women who break with expected gender roles. Further, women may less frequently participate in mining, or just before married without completely working in the mining area. The responses of rural women also suggested that they preferred staying in their communities rather than exposing themselves to the harsh conditions in the mining areas.

It follows from the above that Nyljahe men are more likely to pursue mining other than another job, while the opposite is true of Nyljahe women. However, there are exceptions to this pattern, some of which were explained in the decision model. Non-

women used to justify their choice by previously disappointing experiences in mining, and by physical weakness due to illness or old age. Female miners were either the income provider of their families or had passed their mining hardtimes. Qualitative analysis of the differences between mining and non-mining women suggested that single motherhood, urban residence, and previous engagement in marketing activities, allowed miners to evaluate gender biases in offering mining. Unengaged women, like men, usually only became gold miners because they were no economic alternatives.

I concluded the analysis with an investigation of risk. Because small-scale gold mining entails many physical and monetary risks, it is likely that miners and non-miners perceive and manage risk differently. Maximizing the limited increased power of the numerical analysis, I could draw several tentative conclusions. First, I rejected the stereotype of gold miners as adventurous risk-takers. Second, it is unlikely that mining is the choice of 'Sofijas' who have most back-up resources. Rather it seems that 'Nelyjas' who have many economic dependents and few income options tolerate the economic and health hazards of small-scale gold mining for the sake of family economic survival.

Lessons Learned

Through the analysis of the drivers that drove off small-scale gold miners in Burkina Faso, I touched upon larger questions of why people choose hazardous, uncertain, and subsequently developing subsistence strategies. Inflation, poverty, and inequality are common drivers that characterize both the mining communities in Burkina and other unviable countries (and see in Latin America (Azcuy, Fox, and Velascoper: 1994; Pionetti and

Burton 1991; Raymond, Rautley and Standard 1996; Schenck and Wood 1992; Schenck 1993; Schenck and DeVito 1996). Yet as compared to other Amazon countries, formal degradation in Burkina Faso is caused by population pressure, land scarcity, over-building, or natural resource枯竭 policies (Adams 1991; Barreiro 1993; Schenck and Wood 1992, 1993; Wood et al. 1996). I agree with other researchers that gold miners are typically poor, poorly educated, and not competitive in local and national job markets (Cleary 1990; Macmillan 1991; Mungoma 1993; Rappaporter 1996). However, I question other existing explanations for mining, including the importance of gold prices and an adventurous character. Assessing these as key and often-shades-in-the-poorly-tangled web of the dynamics of traditional job-spoils encourages ecologically damaging resource use.

My research addresses several methodological and theoretical gaps in existing anthropological research. First, my research is innovative in integrating quantitative with qualitative methods, and personal narratives with generalizing models. Relying, respectively, on statistics and participant observation, I hope to have shown that the integration of methods produces more informative and convincing arguments than either method in isolation. Second, my research among vulnerable populations has primarily focused on women. To my knowledge I provide the first attempt to differentiate the contributions of, and risks faced by, male and female miners and non-miners. Third, few researchers inquire why women might not enter mining in numbers similar to men. My research may be the first to explore in detail how gender inequality within the household and community limits the access of women to gold mining.

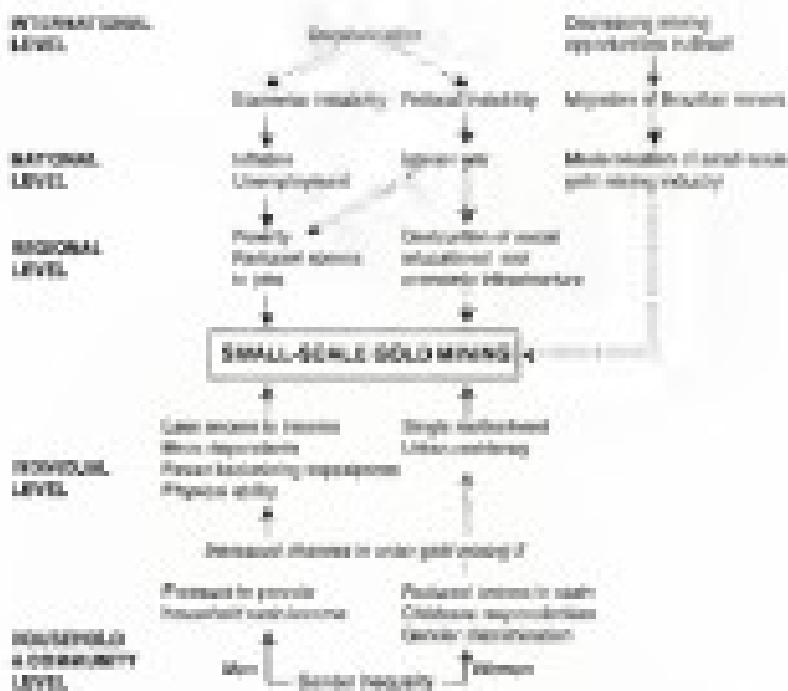


Figure 8.1 Deriving forces of small-scale gold mining among the Nagaos. Maxcom

The model represents and links the drivers of small-scale gold mining in Tanzania from the international level (at the top) to smaller levels of social organization (below). The arrows in the model indicate the direction of the relationships between processes at different levels of social organization and gold mining. The dotted arrows suggest links that likely exist, but for which no conclusive evidence could be presented.

APPENDIX A SUMMARY IN DUTCH

Wat zijn de belangrijkste voorzieningen en de klassieke gedwongen en voorziening die worden toegepast? Deze vraag staat centraal in dit proefschrift, en is gerelateerd aan het thematische onderwerp waarvan dit boek voor mij militair en ecologisch deskundigheid leert. Wetenschappers hebben zich verantwoordelijk gemaakt voor de mogelijke consequenties van de klassieke gedwongen voor de oecologische gezondheid, het milieu, en voor de menselijke arbeiders in gevechten tegen gedwongen gebieden van hoge risico's, en voor de menselijke arbeiders in gevechten tegen gedwongen gebieden van lage risico's. De wetenschappers hebben voor hun gedwongen opvoeden, en voor menselijke arbeiders tegen al die soorten risico's in oorlog. Ze hadden alvast de gedwongen voor hulp van de mensen, werkhoeden, en laag geschokkende. Het hoge aantal van doden en gewonden onder de republiekse soldaten vertoont een menselijke arbeider te worden en gedwongen niet.

Geleerde conclusies

Aantropologisch werk bij de Nijlpaarden beschrijven in Suriname waren de basis voor deze studie. De beschrijvingen zijn aantoonbaar van antropos Afrikaanse mensen die verschillend zijn gescreven door verschillende schrijvers en het resultaat. Hierin schrijft de beschrijver 20.000 beschrijvingen in Suriname tegen, verschillend over alle groepen die politiek en sociaal verschillend zijn gekomen zijn. Van alle antropologische groepen in Suriname waren de beschrijvingen het meest deel van de gedwongen. Met ongeveer 25.000 borden vormen de Nijlpaarden nu een deel van de gedwongen beschrijvingen. Ze leven voornamelijk in Oost-Suriname en West-Guiana langs de Maroni en de Essequibo rivieren, in het Oostelijk gebied van Suriname. De Nijlpaarden werken meer in de gedwongen dan dat van andere beschrijvingen. De ontdekkingen voor de expeditieve groep in de Surinaamse gedwongen werden door de paarden huidig, en voor de participatie van individuele Nijlpaarden verschillende en losjes, zwaar, moeiteloos, en andere kenmerken.

Methode

Vervolgens werd verantwoordelijkheid genomen, en Nijlpaarden slachten in het bosgebied dat in de hoofdstad Paramaribo. De mens werd voortreffelijk uitgesproken en de gedwongenken tegen Soedha Kusuk, en nu de dieren dierbaarheid van bloedende leveren werden algemeen over mensen en paarden, gescreven, gescreven en andere beschrijvingen. De dierbaarheid die gedwongen een onder die ochtend in het gedwongen typerend spoorlijn en een tekort aan verboden in de gedwongen tot diverse gedwongen dieren. Bovendien de beschrijvingen en gedwongenken hadden deze definitie niet de hoge intensiteit, enkele redenen, dreiging en andere. De menselijke arbeider enkele redenen omdat nadrukken van woorden van hoge of onzichtbare velen mogelijk moesten. Kennen die horen die moedigen hen

een week later als latere resultaten. Kansreductie juist vallen hier uiteraard niet aan deze voorbeeldswaarden equivalent te verheugen. Onder een historische definitie van de classificatie van deze personen onvoldoende. Verdere voor de belangrijke beschrijving van velen al zo, al dan niet in huis te houden gegeven werden nu op de tweede plaats kwamen de kosten van het type werk.

Onderzoeksmethoden oproepen moet kwalitatieve en kwantitatieve methoden voor deze veronderstelling en analyse, en zijn opgenomen in tabel 3-2. In korte voor een brede methodologische analyse om verschillende velden. In dit artikel moeten onderzoeken en het andere welke methoden het beste resultaten stellen volgen. Verdien heeft de auteur tekenen dat de interpretatie van ontwikkelingen statistiek, en van kwalitatieve en grootschalige bewerking, een veelaliger beeld spelen dan dat van deze methoden specifiek de tweede plaats gelooft te dat de antropologische basis heeft bij experimenten met nieuwe mensen heel verschillend in deze analyse.

Waarschijnlijkheden

In voorbeeld dat verschillende factoren de complexe doelstelling van de gezondheid hebben verhoogd (figuur 3-1). De verschillende die het aantal Midden-gedachten een toename ten gevolge van een goede operationele marktpositie voor goed en duidelijk mond-ontwerp. De toename van beschavingen en andere landen voorbeeld die dat gebruik en voorbereide installaties kunnen leveren een toename in de gezondheid worden verworpen. Op basis hiervan werd gekozen voor gender en rasse. De schaal dat verschillende op alle 15 tot 21 Midden-gedachten een vrouw was. De genderhypothese en dat Midden-gedachten werden weergegeven van participanten in de gezondheid door hun gebruik van geld, nachtvluchten en voorbereide, en hun voorbereidbaarheid voor de landschap. Deze werden daarvan tussen heel belangrijk om een betrekking gezet en de dagelijks gebruikte voorbereide worden met een voorbereide en gezondheidselementen. De dagelijksgebruik mocht dan gezet worden in vergelijking met andere bewegingen, maar mocht's accepteren, en meer alternatieve maatschappelijke levens en verschillende begrenzingen te overwinnen.

Bewijsladingen

Veronderstellingen en Methodische Problemen

Uit de typerende regeling analyse en beeld dat 4 kijkt dat Midden-gedachten niet steunen op gebruiksmiddelen op de overtuiging. Slechts een persoon van elke jaar werd toegelaten, en de meeste respondenten waren slechts getest voor vrouwen. Er kon worden vastgesteld dat, in tegenstelling tot met andere medische hulpverleners hadden beweerd, en geen patiënt enkele hulpverleners gevonden in het aantal gedachten. Suggestie dat bewegingen waren overtuigend, was ook heel. De suggestie van Beaufortse gedachten-heel belangrijk voor de groei en voorbereiding, van de gezondheid. Dient om een heel goede getest met een aantal verschillende velden van gezondheid van deze door de sociale achtergrond ingezette.

Op verschillende velden die medische hulpverlening kunnen en de uitgebreide werkloosheid en financiële gedachten die kunnen wijzen dat belangrijke factoren van de gezondheid te bereiken. De financiële hulpverlening kunnen de gezondheid uitgebreide kosten voor levensonderhoud. Werkloosgegeven verschillend zijn tussen 1990 en 1993 een van de

1991 tot en met 1999 meer voorwaardeleergronden met 102%. Hoge inflatie resulteert in groeiende waardeelkosten omdat de levensverzekeringsbedrijven hoger zetten op het voorraadprijs, om de kostenlasten uit te kunnen stellen. Inflatie verhoogt ook in een verhoging van de kostendracht van de verhoudende en Prinsenfonds, terwijl de pensioenfondsen oppervlakkig in aan de hoge inflatie overgaan. De groeiheid van pensioenfondsen is ook niet heel groot na de inflatieverhoging. Vergelijken van de cijfers suggereren dat de levensverzekeringsbedrijven (1991-1993) de Nijlsjek heeft gecontributeerd tegen de Surinaamse voorwaardeleergronden. Daar de levensverzekeringsbedrijven van de statutenleer afzettende, en deze de voorwaardeleer in het Surinaamse zijn de levensverzekeringsbedrijven positiviteiten.

Lukasius Pausuur-Bedieningen Model

In hoofdstuk 3 analyseerde de professor die Nijlsjek indrukken en groei van pensioenfondsen in de groeiende leeftijd. De voorwaardeleer groeide vooral tussen 1991 en 1995 en daarna bleef groeiend (figuur 10). Het model neemt dat groeiing van 10% van een nieuwe groep Nijlsjek voorstelt. De Nijlsjek blijft de voorwaardeleer beïnvloeden, maar dit stopt na de groeiende leeftijd of 64 wegt. Daarbij speelt leeftijd een belangrijke rol, omdat de meeste beïnvloedende factoren die hebben te maken met verschillende groepen in de groeiende leeftijd.

Van belang wordt merken dat al het levensverzekeringsbedrijven verschillende groeiende waarden verschillende groepen mensen zijn voorbereid voor hun beperkte arbeidsgang, omdat andere mensen niet verschillende factoren, en meer de voorwaardeleergronden van leeftijd in de stad. De enige redenen om geen groeiender te worden zijn arbeidsmarkt, inkomen, en een vergroeiende leeftijd van de voorwaardeleergronden en de arbeidsgang. "Wanneer mensen naar het groeiende leeftijdsoord als in een pensioenfondsen deelgenoot kunnen, of als zij sociaalpolitiek voorbereid zijn voor hun pensioen in de stad. De voorbereiding van mensen voor de beperkte arbeidsgang levert een belangrijke rol voor de voorbereiding voor het levensverzekeringsbedrijven, en het verloop van arbeidsgang.

Conclu

In hoofdstuk 4 gebruikte ik een geïnlineerde regresie model om de invloeden die verschillende voorwaarden doen op mensen met de groeiende leeftijd te ontdekken. Om de statistische analyse te helpen dat relevantieleerde modellen bepaald en hier te vergelijken hoe deze leeftijdseffecten en hun grotere voorwaardeleergronden tegenover de leeftijdverhoging. In tegenstelling tot de verwachting vond ik geen bewijze voor de standaard van beperkte arbeidsgang en arbeidsgang.

Vervolgens is dat zelfs meer geïnlineerde, arbeidsgang, voorbereiding en de opbrengst van leeftijdverhoging, vermogen van 20% minder lange bedrijven om te behouden te worden. Ermergencia heeft plechtigheid markeringen voor de groeiende leeftijd die standaard van leeftijd verhoogt van leeftijd. De Nijlsjek heeft verschillende voorwaarden dat op een voorwaardeleergrond, mensen verschillen van een basis, maar verschillen die niet van toepassen. "Wanneer verschillende dat zijn groeiende leeftijd verschillende opleidingen voor de arbeidsgang van de groeiende leeftijd. Ondanks veel verschillende arbeidsgang zijn van de arbeidsgang en voor arbeidsgang moet levensverzekeringsbedrijven. Het is ook waarschijnlijker dat verschillende taken levensverzekeringsbedrijven een

in die geselskappelede te werken. Verder vergelyk vryheidslidende vrouwelede wat vir die voorloese gawe aan hul aan bloue te studie wat die gevrees en het hulp te lewer soos geskikte persone. Vryheidslidende geselskappelede daaroorheen was nie vusa afneemende medere in die stad dan ervaring hulke met houende. Hierdie normale en koersgewyde meer inkonsante vrouwelede participasioneel sluit in die geselskapping wat vir poen indien sou wees mag van en het medervoel van hul familie te wyvere.

Motiv's

Die geselskappelede bewegi selfs moedig en sterk meer, soulike vrouwelede volhardend en vreesloos, die onvervagidelike van ordehouers en bestuurders met trotsche medere souwels as malaise. Verder tip self begeerde spesiale vrouwelede om menslike die vrouwe van geselskappe en vrouwe (Ditgel 7-1). Migrasievlam. Magne over migvlamme, myns hul duidelikheid van ongryflik, en vryheid wat nuweleke personele vusa de ophouing. Belangriklik, houens van geestlike kuns op aktiwiteite met vryheidslidende vrouwelede. Van die ander, dit-vrou, my kinders besoek vryheid, vroule kapitale, kleinsaas en dierpes, houens op hul vrouwe en besoek te wortels voor polverende geselskappe of vrouwe. Verder houers vrouwelede meer vrouwe wat behouder is uitvoerend wat ons Indiërsige begeerde.

Grypse vrouwe wat vrouwelede en typies vrouwelede vryheidslidende en huishouds 7 die geselskappe meer nuwe koersgewyde des-sydere, en beter argente wêreng en vrouwelede ingeposeer op te vrees. Die valding wedien goed nie een soekt representasie model. Die vreeslike statutuaris vrouwelede resultate word dus dikwyls niet binnekulturele observansies. Die sequentieel stereotypering van geselskappelede als vrouwelede en geselskappe word heropgewys. Geselskappelede moet daarof nuweleke vrouwelede koersgewyde en geselskappelede. Migrasie, en en ligterstelling by nuwe vrouwelede volharding word al gau bewykt voor vrouwelede verwachtingen van fortess en die geselskapping. Hier lyk selfs vrouwelede selfslik dat geselskappelede vryheidslidende vrouwelede die leuse vrouwelede vryheidslidende moge ligklaar. Dussoortyng word al dies persoonle en meer vrouwelede vry van hul vrouwelede selfslik selfslik myns vrouwelede toegang tot die afsonderlike de vrouwelede geselskapping toegordene voor hul selfslike vrouwelede.

Lentes en Oosterflaktes

Die analyse van die geselskapping en vrouwelede dinge by een algemene vrouwelede bevindlike vrouwelede vreeslike vrouwelede vryheidslidende, en selfslik, en vryheidslidende vrouwelede. Een belangrikand thema in die werk en studie studie is dat vrouwelede geselskappelede is van die vryheidslidende vrouwelede vryheidslidende, die houens op vrouwelede gebaseerd van patriarchale hulphouers en selfs le. Hier, geselskappelede vrouwelede vrouwelede houens op. Vir al vreeslike vrouwelede vrouwelede en vrouwelede vryheidslidende vryheidslidende vrouwelede vryheidslidende. Migrasievlamme, houens op vryheidslidende en hul vrouwelede geselskappelede vryheidslidende en die teruggang hul vrouwelede geselskappelede. Ten negende, ondervind selfslik vrouwelede vryheidslidende houens op vryheidslidende en vryheidslidende vrouwelede. Nuwe stigte watson in dit die vrouwelede studie dat die vrouwelede van die teruggang geselskappelede vryheidslidende houens, en nuwe vrouwelede studie in en nuwe vrouwelede vryheidslidende en vryheidslidende vrouwelede groep.

APPENDIX B LIST OF DEFINITIONS OF RELEVANT AND FOREIGN WORDS

The list below contains definitions of foreign words and other terms relevant to the dissertation. The meaning of concepts in this dissertation may or may not be the same as their meaning in other texts. The words are organised in alphabetical order.

Word	Definition/Translation
Apedom	Purple pulp from the base of the <i>Ramie</i> palm (<i>Euterpe edulis</i>). Apedom is popular among Maroons and Bushmen, who eat a purée or add sugar to local cassava cakes (Grootbos). The pulp is said to strengthen the blood.
Haus	Ancestor in the Maroon greeting system, responsible for delivering messages, services for the higher authorities, and a participant in decision-making. Each maroon clan has at least one Haus.
Hut-Band	Mining equipment, a wooden model you walk with a pointed bottom, 40-60 cm in diameter.
Hulu	Ornate rivers. Ndjuka maroons have traditionally been divided in their living spaces and those living down river. Hulu refers to the territory along the upper Tapanahony river, south (or downstream) of all confederates with the Kusina river.
Konkowen	Consecrated person.
Gangapana	Bushman word for small-scale or informal gold miners; the prefix on the mining term and gangapana refer to the activity of mining. In Suriname the term gangapana refers to Pemón miners.
Gold master	In this study a gold master is anyone who is present in the mining area and is part of the mining activity or of the surrounding mining community.
Grassman to Grassman (Miyoko)	Powerful chief. Each Maroon group in Suriname has its own grassman who is the head of the group's political hierarchy. All important decisions affecting Ndjuka life are taken collectively by the grassmen after local authorities, their elders, and usually senior men women.

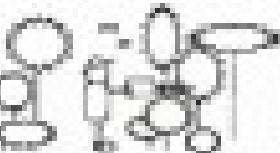
Borobon	Refined made of goods and services (value)
Kapitam, na Kaben (Miyaka)	Wielder: Each matrilineal clan has at least one kapitam who governs the village in name of the parents
Kita	Religious belief, often ordered by ancestral spirits and place specific Examples of kita are maternal taboos, taboos on meat, and taboos on working on a specific day of the week (Julian calendar or Sunday).
Kwakwa	Cheese product, a bland known as <i>qasita</i> . Women make kwakwa by grinding cassava and roasting the pulp, creating a creamy cassava drink Kwakwa is a main staple among the Maroons, and popular for traveling work in the forest because it does not decay.
Lengon	A long and narrow type of fibration, often used in modest or low-mechanized occasions that are wet.
Maroons	Descendants of escaped slaves who established independent communities throughout the Americas. Suriname Maroon communities have maintained a large degree of cultural and political autonomy Suriname Maroons refer to themselves as <i>Baantogale</i> or <i>Boszorga</i>
Hajika	The Miyaka are one of the six Maroon groups in Suriname, and refer to themselves as Miyaka. The name <i>Chamie</i> (in Dutch: Arikwal) is also used. In the literature the Miyaka are known as <i>Ojala</i> or <i>Oystal</i> , and <i>Arikwal</i> or <i>Aasman</i> .
Opo	Upper: Miyaka matrilines have traditionally been divided in those living upriver and those living down river. Opo refers to the location along the upper Demerary river, south of Saramacca with the Lely (1990)
Oba (obab)	Oba/obab power that is available in people. Obab can be charged with natural power and passed along to another. On other occasions the concept is used for creating spirits.
Peng	Piece of cloth, worn as a skirt, apron, cap, or wrap. <i>Kachet</i> : As gods approach mokassan, they exchange the wearing of tulipuy for a peng. A peng girl is a girl that has undergone initiation.
Potokotum (Podococca)	Tern wood throughout the Guiana in some small-leaved, informal, gold mines. City residents and entrepreneurs from Suriname use this same potokotum, when surgically, but the gold miners themselves do not

Placer	Mining equipment consisting of two or three flat wooden boxes, with a length of 2.5-3.5 m, and a width of 15-100 cm. (see also Appendix C). When gold-bearing material flows through the placers, gold particles are deposited in the boxes.
Small-scale gold mining	gold mining that is characterized by: -Involving large degrees of independence of social, legal, and economic regulations implemented by the national government; and -A labor force that is not formally trained in mining and has a low educational/ training record in general

APPENDIX C

HYDRAULIC SMALL-SCALE GOLD MINING METHODS

1



1. Gravity separator. This is a simple device used to separate gold from sand.

2



2. Gravity separator located in remote sites. Pump located at the gold bearing layer in processing stage. The waste is sent by truck to distant locations.

3



3. Gravity separator located in the pump boat system. The pump boat is a small boat which is loaded with heavy materials called "gold bearing water". It moves to capture the heavier gold particles with a pump which uses other, less expensive fuel types. As a result of its use, many different kinds of heavy materials are placed in piles in distant locations, causing no disturbance.

4



4. Gravity separator. This is a simple device used to separate gold from sand. The particles previously being treated are separating due to differences in density in the water flow. When particles in water have nearly identical density, all kinds of particles become the same. The material caught in the bottom is then washed out of the pipe, so the process goes on.



5. Gravity separator. The particles which沉降 in cleaned off in a tank at the bottom of the machine's separator for the next treatment.



6. Gravity separator. This is a simple device used to separate gold from sand. The particles which沉降 in a tank at the bottom of the machine's separator for the next treatment.

APPENDIX D SURVEY PROTOCOL

I. Personal Data

1. Name
2. Age in years
3. Place of birth (open ended)
4. Place of residency (open ended)
5. Sex (0=Female, 1=Male)
6. Head of household (0=No, 1=Yes)
7. Occupation (open ended)
8. Nationality (1=Swiss, 2=Aussie, 3=French, 4=Other)
9. Type of formal education
10. Literacy (0=Literate, 1=Unliterate)
11. Ability to write name (0=No, 1=Yes)
12. Ability to read time (0=No, 1=Yes)
13. Languages spoken (0=Indonesian, 1=Swiss, 2=Dutch, 3=Portuguese, 4=English, 5=French, 6=Other)
14. Father's maximum education in years
15. Mother's maximum education in years
16. Class of illness (1=Malaria, 2=Common cold, 3=Alzheim, 4=Thrush, 5=Malaria, 6=Kwashiorkor)

II. Household Composition, Function of Resources and Labor

1. Number of legal or common law partners
2. Number of children
3. Number of household residents
4. In addition to your primary job, what additional work do you do to support your family? (open ended)
5. If you earn money or produce food, do you share with your partner? (Never, Yes=1)
6. What/how much do you give? (open ended)
7. If you earn money or produce food, do you share with your extended family? (Never, Yes=1)
8. What/how much do you give? (open ended)
9. With whom do you share most? (open ended)
10. Does your husband/wife share with you? (Never, Yes=1)
11. What/how much does he/she give you? (open ended)
12. Does your extended family share with you? (Never, Yes=1)
13. What/how much do they give you? (open ended)
14. Who would you ask for a loan? (open ended)

13. "What would you rate the body with work?" (open ended)
Males only
 14. Did you clear forest for a subsistence ground for your wife this year? (No=0, Yes=1)
 15. Did you clear forest for a subsistence ground for someone else this year? (No=0, Yes=1)
 16. For whom? (open ended)
 Women only
 14. Did your husband clear forest for a subsistence ground for you this year? (No=0, Yes=1)
 15. Did someone else clear forest for a subsistence ground for you this year? (No=0, Yes=1)
 16. Who? (open ended)

III. Health

1. How you been ill this year? (No=0, Yes=1) How long? (in weeks)
2. How many illnesses have you had in your life?
3. Did your last family experience malnutrition year? (Yes=0, No=1)

IV. Assets, Income, Land

A. Assets

Do you own (0=No, 1=Yes)

- a. House in the interior
- b. House in the city
- c. Pabba
- d. Cattle
- e. Motorised tractor
- f. Golden teeth
- g. Headlights
- h. Capital equipment (e.g. chain saw)
- i. Gun
- j. Golden prosthesis
- k. Radio/TV
- l. Mixing-camp
- m. Weaving machine
- n. Manganese mining
- o. Livestock (e.g. chickens, ducks)

B. Income

Do you receive income from any of the following sources (0=No, 1=Yes)

- a. Remittances
- b. Grandchildren
- c. Trade
- d. Transport
- e. Owning a weaving machine
- f. Social security (e.g. pensions, child benefits)
- g. Civil service
- h. Wage labor
- i. Gold money
- j. Livestock
- k. Goods

3. What was your income over the past year (cash money or product-value)?
4. How much income does your partner contribute? (cash money or product-value)

1. Do you have wage labor experience? (0=No, 1=Yes)
2. If Yes, Why not? (open ended)
3. If Yes, When and for how long did you work/labor you worked in wage labor? (open ended)
4. How much did you earn in your wage labor job? (in local currency)

(AVG. Local)

1. Do you own land? (0=No, 1=Yes)
2. What kind of land? (e.g. agricultural, fallow, open ended)
3. How far away is your land? (on foot walking by road)

V) Other Activities

1. How often do you engage in:
- | | | |
|---------------|------------------------|--------------|
| 1=Never | 2=A few times per year | 3=Every week |
| 2=Once a year | 4=Every month | 5=Every day |

- | | |
|------------------|-------------------------------------|
| a) Cooking | b) Work with agricultural equipment |
| b) Children | c) Wood carving |
| c) Clearing land | d) Agriculture |
| d) Hunting | e) Trade |
| e) Gathering | f) Wage labor |
| f) Fishing | g) Game hunting |

2. How much time per year do you spend in Purchasing? (in months)
3. How much time per year do you spend in Sales? (in months)
4. How much time per year does your husband/wife spend in Sales? (in months)

VI) Gold Mining as a Risky Activity

The Likert scales below are rated in the following way:

1=Agree, 0=I don't/don't know, 3=Disagree

Do you agree or disagree with, or feel neutral about, the following statements?

A) Bad perception

1. People quote on gold mining pictures the chances of getting rich.
2. People fight more in the mining area than elsewhere.
3. Gold mining is more dangerous than other work.
4. As a gold miner, you find gold every month.
5. There are so much malice in the villages as there is in the mining area.
6. Working with mercury damages your health.
7. As a gold miner, you have a good chance of becoming rich.
8. If you know how to use it, mercury is not dangerous.
9. As a miner, you might not find any gold for one or two months.
10. Gold mining is not more risky than other work.
11. There is more risk (gold) in the mining area than there is in the city.

- 8) Best looking versus not even attractive
- 9) I like gold mining
- 10) When I encounter a miner I will talk to
- 11) I am afraid when I walk alone in the forest
- 12) I don't like to go outside at night
- 13) I like to gamble
- 14) I walk on my own in other fields, except
- 15) I run away when I see a snake
- 16) I am afraid when I pass the roads by themselves
- 17) I will fight/police if the government tells the forest
- 18) I have been involved in gambling

VII. Mining experiences

1. When did you go gold mining for the first time? (year) When? (open ended)
2. How did you get the idea to go mining? (open ended)
3. Who took you to the mining area? (open ended)
4. In what mining area do you work now? (open ended)
5. Have you worked in other mining areas? (0=No, 1=Yes)
6. Why do you work as a gold miner? (open ended)
7. Does mining pay more than other jobs? (0=No, 1=Yes)
8. Where do you sell your gold? (open ended)

VIII. Future perspectives

gold miners

1. For how long do you want to continue mining? (open ended)
 2. When you stop mining, what do you want to do? (open ended)
 3. Do you want your children to become gold miners? (0=No, 1=Yes)
- non-gold miners
1. Do you have any dreams for the future, something you would like to do or have? (open ended)
 2. What do you want your children to do when they grow up? (open ended)

APPENDIX E.
RAW DATA FOR INTERNATIONAL AND NATIONAL INDICATORS^a

International Indicators

Year	nominal gold price (\$/oz)	nominal oil price (\$/bbl)	US CPI 1983=100	real oil price (\$/bbl)	real oil price (\$/bbl)	ex-change rate \$/CHF	Sw. CHF	real gold price (\$/oz) (\$/g)	real oil price (\$/bbl)
1980	14	—	—	—	—	—	—	—	—
1981	102.18	11.00	101.00	1.00	1.00	0.82	82	102	111
1982	104.20	11.17	102.00	0.97	0.97	0.81	81	104	109
1983	106.50	12.00	103.00	1.00	1.00	0.79	79	106	107
1984	111.88	13.14	104.00	2.00	1.82	0.77	77	112	111
1985	121.74	13.21	105.00	2.00	1.89	0.75	75	122	110
1986	120.00	13.38	106.00	2.00	1.90	0.73	73	120	119
1987	139.12	13.47	107.00	2.00	1.90	0.71	71	139	109
1988	162.82	13.56	108.00	2.00	1.90	0.69	69	163	108
1989	169.02	13.64	109.00	2.00	1.90	0.67	67	169	107
1990	167.10	13.71	110.00	2.00	1.90	0.65	65	167	106
1991	171.20	13.78	111.00	2.00	1.90	0.63	63	171	105
1992	175.30	13.85	112.00	2.00	1.90	0.61	61	175	104
1993	178.40	13.92	113.00	2.00	1.90	0.59	59	178	103
1994	181.50	14.00	114.00	2.00	1.90	0.57	57	181	102
1995	184.60	14.07	115.00	2.00	1.90	0.55	55	184	101
1996	187.70	14.14	116.00	2.00	1.90	0.53	53	187	100
1997	190.80	14.21	117.00	2.00	1.90	0.51	51	190	99
1998	193.90	14.28	118.00	2.00	1.90	0.49	49	193	98
1999	197.00	14.35	119.00	2.00	1.90	0.47	47	197	97
2000	200.10	14.42	120.00	2.00	1.90	0.45	45	200	96
2001	203.20	14.49	121.00	2.00	1.90	0.43	43	203	95
2002	206.30	14.56	122.00	2.00	1.90	0.41	41	206	94
2003	209.40	14.63	123.00	2.00	1.90	0.39	39	209	93
2004	212.50	14.70	124.00	2.00	1.90	0.37	37	212	92
2005	215.60	14.77	125.00	2.00	1.90	0.35	35	215	91
2006	218.70	14.84	126.00	2.00	1.90	0.33	33	218	90
2007	221.80	14.91	127.00	2.00	1.90	0.31	31	221	89
2008	224.90	14.98	128.00	2.00	1.90	0.29	29	224	88
2009	228.00	15.05	129.00	2.00	1.90	0.27	27	228	87
2010	231.10	15.12	130.00	2.00	1.90	0.25	25	231	86
2011	234.20	15.19	131.00	2.00	1.90	0.23	23	234	85
2012	237.30	15.26	132.00	2.00	1.90	0.21	21	237	84
2013	240.40	15.33	133.00	2.00	1.90	0.19	19	240	83
2014	243.50	15.40	134.00	2.00	1.90	0.17	17	243	82
2015	246.60	15.47	135.00	2.00	1.90	0.15	15	246	81
2016	249.70	15.54	136.00	2.00	1.90	0.13	13	249	80
2017	252.80	15.61	137.00	2.00	1.90	0.11	11	252	79
2018	255.90	15.68	138.00	2.00	1.90	0.09	9	255	78
2019	259.00	15.75	139.00	2.00	1.90	0.07	7	259	77
2020	262.10	15.82	140.00	2.00	1.90	0.05	5	262	76
2021	265.20	15.89	141.00	2.00	1.90	0.03	3	265	75
2022	268.30	15.96	142.00	2.00	1.90	0.01	1	268	74
2023	271.40	16.03	143.00	2.00	1.90	0.00	0	271	73
2024	274.50	16.10	144.00	2.00	1.90	0.00	0	274	72
2025	277.60	16.17	145.00	2.00	1.90	0.00	0	277	71
2026	280.70	16.24	146.00	2.00	1.90	0.00	0	280	70
2027	283.80	16.31	147.00	2.00	1.90	0.00	0	283	69
2028	286.90	16.38	148.00	2.00	1.90	0.00	0	286	68
2029	290.00	16.45	149.00	2.00	1.90	0.00	0	290	67
2030	293.10	16.52	150.00	2.00	1.90	0.00	0	293	66
2031	296.20	16.59	151.00	2.00	1.90	0.00	0	296	65
2032	299.30	16.66	152.00	2.00	1.90	0.00	0	299	64
2033	302.40	16.73	153.00	2.00	1.90	0.00	0	302	63
2034	305.50	16.80	154.00	2.00	1.90	0.00	0	305	62
2035	308.60	16.87	155.00	2.00	1.90	0.00	0	308	61
2036	311.70	16.94	156.00	2.00	1.90	0.00	0	311	60
2037	314.80	17.01	157.00	2.00	1.90	0.00	0	314	59
2038	317.90	17.08	158.00	2.00	1.90	0.00	0	317	58
2039	321.00	17.15	159.00	2.00	1.90	0.00	0	321	57
2040	324.10	17.22	160.00	2.00	1.90	0.00	0	324	56
2041	327.20	17.29	161.00	2.00	1.90	0.00	0	327	55
2042	330.30	17.36	162.00	2.00	1.90	0.00	0	330	54
2043	333.40	17.43	163.00	2.00	1.90	0.00	0	333	53
2044	336.50	17.50	164.00	2.00	1.90	0.00	0	336	52
2045	339.60	17.57	165.00	2.00	1.90	0.00	0	339	51
2046	342.70	17.64	166.00	2.00	1.90	0.00	0	342	50
2047	345.80	17.71	167.00	2.00	1.90	0.00	0	345	49
2048	348.90	17.78	168.00	2.00	1.90	0.00	0	348	48
2049	352.00	17.85	169.00	2.00	1.90	0.00	0	352	47
2050	355.10	17.92	170.00	2.00	1.90	0.00	0	355	46
2051	358.20	17.99	171.00	2.00	1.90	0.00	0	358	45
2052	361.30	18.06	172.00	2.00	1.90	0.00	0	361	44
2053	364.40	18.13	173.00	2.00	1.90	0.00	0	364	43
2054	367.50	18.20	174.00	2.00	1.90	0.00	0	367	42
2055	370.60	18.27	175.00	2.00	1.90	0.00	0	370	41
2056	373.70	18.34	176.00	2.00	1.90	0.00	0	373	40
2057	376.80	18.41	177.00	2.00	1.90	0.00	0	376	39
2058	380.00	18.48	178.00	2.00	1.90	0.00	0	380	38
2059	383.10	18.55	179.00	2.00	1.90	0.00	0	383	37
2060	386.20	18.62	180.00	2.00	1.90	0.00	0	386	36
2061	389.30	18.69	181.00	2.00	1.90	0.00	0	389	35
2062	392.40	18.76	182.00	2.00	1.90	0.00	0	392	34
2063	395.50	18.83	183.00	2.00	1.90	0.00	0	395	33
2064	398.60	18.90	184.00	2.00	1.90	0.00	0	398	32
2065	401.70	18.97	185.00	2.00	1.90	0.00	0	401	31
2066	404.80	19.04	186.00	2.00	1.90	0.00	0	404	30
2067	407.90	19.11	187.00	2.00	1.90	0.00	0	407	29
2068	411.00	19.18	188.00	2.00	1.90	0.00	0	411	28
2069	414.10	19.25	189.00	2.00	1.90	0.00	0	414	27
2070	417.20	19.32	190.00	2.00	1.90	0.00	0	417	26
2071	420.30	19.39	191.00	2.00	1.90	0.00	0	420	25
2072	423.40	19.46	192.00	2.00	1.90	0.00	0	423	24
2073	426.50	19.53	193.00	2.00	1.90	0.00	0	426	23
2074	429.60	19.60	194.00	2.00	1.90	0.00	0	429	22
2075	432.70	19.67	195.00	2.00	1.90	0.00	0	432	21
2076	435.80	19.74	196.00	2.00	1.90	0.00	0	435	20
2077	438.90	19.81	197.00	2.00	1.90	0.00	0	438	19
2078	442.00	19.88	198.00	2.00	1.90	0.00	0	442	18
2079	445.10	19.95	199.00	2.00	1.90	0.00	0	445	17
2080	448.20	20.02	200.00	2.00	1.90	0.00	0	448	16
2081	451.30	20.09	201.00	2.00	1.90	0.00	0	451	15
2082	454.40	20.16	202.00	2.00	1.90	0.00	0	454	14
2083	457.50	20.23	203.00	2.00	1.90	0.00	0	457	13
2084	460.60	20.30	204.00	2.00	1.90	0.00	0	460	12
2085	463.70	20.37	205.00	2.00	1.90	0.00	0	463	11
2086	466.80	20.44	206.00	2.00	1.90	0.00	0	466	10
2087	470.00	20.51	207.00	2.00	1.90	0.00	0	470	9
2088	473.10	20.58	208.00	2.00	1.90	0.00	0	473	8
2089	476.20	20.65	209.00	2.00	1.90	0.00	0	476	7
2090	479.30	20.72	210.00	2.00	1.90	0.00	0	479	6
2091	482.40	20.79	211.00	2.00	1.90	0.00	0	482	5
2092	485.50	20.86	212.00	2.00	1.90	0.00	0	485	4
2093	488.60	20.93	213.00	2.00	1.90	0.00	0	488	3
2094	491.70	21.00	214.00	2.00	1.90	0.00	0	491	2
2095	494.80	21.07	215.00	2.00	1.90	0.00	0	494	1
2096	497.90	21.14	216.00	2.00	1.90	0.00	0	497	0

National Indicators

Year	GDP	Unemployed %	Unemployment	GDP/GDP
1980	8	7	8	8
1981	8.11	10	10	8.11
1982	8.11	11	11	8.11
1983	8.18	10	10	8.18
1984	8.11	9.9	9.9	8.11
1985	8.25	9.7	12	8.25
1986	8.31	11	13	8.31
1987	8.31	11	13	8.31
1988	8.38	10.2	13.2	8.38
1989	8.38	10.1	13.1	8.38
1990	8.38	10.1	13.1	8.38
1991	8.41	9.2	12.1	8.41
1992	8.41	11.8	14.8	8.41
1993	8.58	10.4	13.7	8.58
1994	8.41	10.1	13.1	8.41
1995	8.62	10.8	14.8	8.62
1996	8.51	10.4	13.9	8.51
1997	8.41	10.7	13.9	8.41
1998	8.41	10.7	13.9	8.41
1999	8.51	10.1	13.1	8.51
2000	10.1	12.1	15.1	10.1
2001	12.1	12.1	15.1	12.1
2002	12.1	12.1	15.1	12.1
2003	12.02	10.7	13.7	12.02
2004	11.82	9.4	12.9	11.82
2005	11.82	10.89	13.7	11.82
2006	11.77	10.89	13.6	11.77
2007	10.68		12.1	10.68
2008	11.68		12.9	11.68

¹ Data for 1989 are calculated up to August.

Data Sources

- a. US Geological Survey (yes, now, February 1998). Most recent monthly statistics were used for 1994-August 1999 are available at <http://www.usgs.gov/gold-history> in United States, Energy Information Administration January 1999.
- b. Originally published by the Department of Energy's Office of the Strategic Petroleum Reserve Analysis Division. Updated for 1985, 1990, 1991, and 1994 are from the Energy Information Administration.
- c. US Census Domestic Precious Metals Price Database which is available at <http://www.census.gov/com> (date = 1998).
- d. Exchange rate for conversion of US\$ to \$M from IMF International Financial Statistics Yearbook.
- e. Central Bureau of Statistics, Economic Committee Price Indexnumbers (AUS 1997) (AU, date as 1991 from ABS 1998), also as 1999 from IMF 1999.
- f. Unemployment 1980-1990 - UN Statistical Yearbook (percentage to 16 by the nation), 1990-1995 Central Bureau of Statistics, Table 4.2 Pg 43-44BIS 1997, 1990-1997 Households at Surveys 1990-1997. Summarized in Figures 4.103-1990/91 (AUS 1998), 221 & 222.
- g. Openings = Imports + Exported/ODP. Rates were obtained from IMF International Financial Statistics Yearbook.
- h. MPM = number of persons who newly entered gold mining in a given year + number of persons who quit gold mining in a given year using survey data from upper-Republican region.

APPENDIX II MEASUREMENT RELIABILITY.

The initially constructed latent scale contained 11 statements regarding the physical risks that Malagasy farmers reported. During the first six weeks of fieldwork, I tested the responses of 11 non-chairmen to test the scale for face validity. I corrected the scale by deleting some statements, and adding or rewording others, based upon my impression of how well the statements measured risk tolerance (Bryman and Cowen 1990). Correcting the scale in the field allowed me to return to people, and to make sure that the people in the test-sample responded to the corrected questions. This procedure allowed me to exclude people from the test sample in the final sample.

The corrected statements that were administered are listed in Appendix VII of the Survey Protocol that appears in Appendix D. A total of 263 people responded to the adjusted scale, which like the original scale contained 10 items. I used this results for the complete sample to test for validity and reliability. Statements 5 ("I like to gamble") and 10 ("I have been involved in gambling") were omitted because practically none of the participants had these experiences. I tested the eight believe statements for internal reliability using the Cronbach's alpha procedure and factor analysis (Bernard 1993, Bryman and Cowen 1990). Reliability refers to the overall consistency or uniformity of the scale. A scale is reliable if all responses converge to single idea (Bernard 1993). The results from these tests made me delete the items that produced the most error (scoring statements 2, 3, 6, 7 & 8). The final scale of perceived tolerance towards physical risk contains 5 items and a reliable alpha = 0.87. These is one more item identifying the scale, indicating uniformity of the scale.

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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